

The New England Journal of Medicine

Formerly The Boston Medical and Surgical Journal
Established 1828

Published by the Massachusetts Medical Society Under the Jurisdiction of
The Committee on Publications

VOLUME 224

JANUARY-JUNE, 1941

8 Fenway, Boston

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Owned and Published by the Massachusetts Medical Society

Published weekly in Boston at 8 Fenway Domestic \$6 per ann. m. 25c per copy Canada \$7.04 foreign \$8.52
Entered as second class matter November 16 1932 at the post office at Boston Massachusetts under the Act of March 3 1879
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VOLUME 224

JANUARY 2, 1941

NUMBER 1

RECOLLECTIONS AND LETTERS OF SIR JAMES MACKENZIE*

JOSEPH H. PRATT, M.D.†

BOSTON

THE career of James Mackenzie is without a parallel in medical annals, and the facts of his life read like a romance. A poor boy, the son of a Scottish farmer, he left school at the age of fifteen. For him schoolbooks had no attraction, but the colored lights in the windows of a chemist's shop lured him, and he became an apothecary's apprentice. That this was not the best foundation for medical studies everyone must agree. Finally he realized his mistake, and at the relatively advanced age of twenty-one he began his medical studies in the University of Edinburgh. He graduated in 1878, and after serving a year's residence in the Royal Infirmary became an assistant in a medical "firm" in the manufacturing city of Burnley, England. This firm had been established about eighty years earlier, and the successors of the founders carried on a large general practice. There was nothing in his environment to stimulate him to do anything more than conscientious routine work in the diagnosis and treatment of cases representing the entire range of medical practice, yet he developed new methods of clinical investigation and made important discoveries in diseases of the heart and in the nature and significance of pain in visceral disease. He showed that the sphygmograph, which had come to be regarded as a physiological toy, could be made to yield information of great clinical value.

After twenty-eight years of general practice, he broke all precedents by moving from a provincial English town to London, he became a consulting physician, limiting his practice to diseases of the heart. He had no school or hospital connections, and was practically a stranger in the metropolis, his name was almost unknown to London physicians. Every avenue leading to advancement seemed closed to him. He had a wife and two children to support, and at first there were no patients. His biographer says that his income dur-

ing that first year in London was only £114. Then, some time during his second year, he awoke to find himself famous. His book on the heart had a great sale, and his name became a household word. Patients in large numbers were referred to him by physicians in this country and Canada as well as in Great Britain. A new department for cardiac disease was established for him at the great London Hospital. He was made a fellow of the College of Physicians and a fellow of the Royal Society, and the honor of knighthood was conferred upon him by the King. At the high tide of prosperity he gave up everything he had obtained in London and moved to the small town of St Andrews in Scotland, to establish an institute for clinical research, largely at his own expense. Increased honors reached him there, and he was made Physician to the King in Scotland. In August, 1924, because of ill health he retired to London, where he passed the last months of his life. His death on January 25, 1925, was due to disease of the heart, the organ with which his name will always be associated. His mental activity and energy continued to the last, and he wrote the final sentences of a book summarizing five years' work at St Andrews less than forty-eight hours before he succumbed to coronary thrombosis.

Sir James Mackenzie made three visits to America; the first, a nonmedical trip, in 1880 after recovery from typhoid fever, when he traveled as far west as Yellowstone National Park. Since he had no money, being only two years out of medical school, he probably accompanied a patient. The second trip was in 1906, when he attended the meeting of the British Medical Association in Toronto. He was then a general practitioner, and he came and went largely unnoticed by the recognized leaders of the profession. During his third visit in 1918 he was everywhere received as a distinguished representative of British medicine. He was selected at that time by the British government as a member of a small commission of medical men to visit the United States, and he attended

*Gerrish Memorial Lecture delivered at the Central Maine General Hospital, Lewiston, Maine May 24, 1940.

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among other meetings those of the Massachusetts Medical Society and of the American Medical Association. He was always a general practitioner at heart. When in Boston in 1918, as he was leaving my home in Brookline, we met my friend and neighbor, Dr. George K. Sabine, a leading family doctor in that town. Sir James grasped his hand warmly and said it was indeed a pleasure, after associating only with surgeons and consulting physicians, to meet one of his own kind, a general practitioner.

My first acquaintance with Dr. Mackenzie was made at the Toronto meeting in 1906, which I attended with my friend, Dr. Henry A. Christian. Although representatives of British medicine whose reputations were world wide were at the meeting, the one who impressed us most was the general practitioner from Burnley, James Mackenzie. He was then fifty-three years of age. We saw a tall, well-built man with a fine head, noble brow and kindly eyes, who spoke with a contagious enthusiasm. Two symposiums were held by the medical section; one dealt with blood pressure, the other with heart block. Mackenzie read a paper in each of these. This was certainly an unusual distinction. On the same program were such names as Ludwig Aschoff, Sir Clifford Allbutt, Sir William Broadbent, and George A. Gibson, of Edinburgh. Mackenzie's paper was the third in a series on heart block that he had written within a short period. It represented the results of long and faithful investigation by means of simultaneous records of the jugular and radial pulses. He reported a most unusual case of transient heart block that occurred when the patient swallowed, and proved its existence by clear, convincing tracings. After his death the writer of a memorial sketch¹ in the *Lancet* stated that it was this paper that first made his labors clear "to anything like a large audience." When I was in London two years later a leading physician referred to Mackenzie in a condescending manner as "Heart-block Mackenzie." At the Toronto meeting, Mackenzie also demonstrated his ink-writing polygraph, newly invented, which enabled him to make continuous pulse tracings of the radial and venous pulse for many minutes. The jugular pulse tracings made with other types of apparatus, which two physicians presented, did not compare with those shown by Mackenzie. In fact they were so poor that definite interpretation of the tracings was difficult if not impossible.

After the Toronto meeting Mackenzie came to Boston, accompanied by his friend, Dr. Arnold Lea. He wished particularly to meet Professor William T. Porter of the Physiological Depart-

ment at the Harvard Medical School, with whose important paper on the filling of the heart he was familiar. It was characteristic of him then, as it had been in earlier years, to seek help from physiologists. Dr. Porter had organized and developed a company which made physiological apparatus for the use of students in medical schools. Unforeseen obstacles prevented the fulfillment of Dr. Mackenzie's hope that his ink-writing polygraph might be manufactured by Dr. Porter's instrument makers. During this visit Mackenzie gave a demonstration of his instrument one evening after dinner to a group of young men that I assembled.

He was particularly interested in a case of mitral stenosis, with absolutely irregular pulse, at my outpatient clinic at the Massachusetts General Hospital, and he referred to it in a letter written a year later. He pointed out to those gathered about him that the typical presystolic murmur of mitral stenosis was absent, and that it is never found after the auricular wave has disappeared from the venous pulse.

In 1902 he published his first book, *The Study of the Pulse*, which had only a small sale in England and in this country. This book, considered by some his greatest and most original work, contained reproductions of over three hundred carefully analyzed tracings that he had made in cases observed in his private practice. These consisted of records of the arterial, venous and hepatic pulses and many cardiograms. Nothing to compare with this collection had ever been published. He began to make tracings of the jugular pulse in 1891. For years he used for this purpose a Marey tambour attached to a Dudgeon sphygmograph, a simple equipment that could be carried in the pocket. His first paper—and an excellent one—dealing with the venous pulse was published in 1892 in Volume I of the *Journal of Bacteriology and Pathology*. He showed clearly that Friedreich's interpretation of the waves in the venous pulse, universally accepted as correct for thirty years, was wrong, in that the wave caused by the contraction of the auricle was attributed to the ventricle. Mackenzie proved that this error was due to incorrect timing of events in the cardiac cycle. In the preface to his book, *The Study of the Pulse*, he writes:

This volume has been written amid the distractions of the life of a busy general practitioner. I have seldom been able to give an uninterrupted hour's study to the subject. While working out some argument, interruptions have often been fatal to its completion, as it has been days and even weeks before I have again been able to resume it. While the working out of these problems has been a source of interest and of

pleasure, the labour of writing them out has been a weariness to the flesh. This I do not offer as an excuse, but as an explanation.

The book had been recommended to me by Dr Walter I. Steiner, of Hartford, Connecticut, who was possibly the first American to recognize its value, but I had not read it. I told Dr Mackenzie during his Boston visit that I was going to buy his book. He replied "Don't. Nobody does. I have a shed full at home and will send you a copy." Instead of mailing the book, he waited until he could send it by a messenger. Some months later Dr. George W. Ross, of Toronto, arriving in Boston from England, brought me the book. Ross had spent a short time in Burnley with Mackenzie, observing his work, and was probably the first physician from this side of the Atlantic to visit Burnley for the purpose of learning Mackenzie's methods. There he could get a knowledge of certain aspects of cardiac disease not attainable elsewhere in the world. What Mackenzie had to offer can be appreciated from the following letter written in Burnley, and dated May 20, 1907:

I am very glad things are prospering with you, though I am sorry you could not come and see Burnley. My reason for regret is that I have here such a wonderful selection of cases illustrating a great many forms of heart change, unsuspected and unrecognized, and I fear much that my removal will take me out of touch of these cases. Still I shall be glad to renew our acquaintance when you come to London next year.

I have just returned from attending the meetings of a newly formed Association of Physicians in London. I expounded some new views as to the meaning of the continual irregular heart and the direct causes of heart failure in these cases, which views were received appreciatively, but as my audience did not appreciate my facts, I fear they were not convinced. I saw Osler there and also your adoring friend Martin of Montreal, who hopes to spend next Thursday night here before sailing from Liverpool. I have also had a pleasant visit from Dr. Grosh of Toledo, who is to be expounding some views on the venous pulse at the meeting on June 6th at Atlantic City.

My book that Ross left you is sadly behind the times, but it gives an idea how to set about this sort of work. Your hands are too full with your own line of study and as this requires a long and painful training, you might start some of your promising juniors—it will amply repay them for the trouble. I find Ross a most apt pupil, and with him in Canada and Grosh in Toledo, I am hoping that these two sources will lighten a big lump of your vast continent. They are also promising good things at Johns Hopkins.

Remember me to Joslin, Christian, and the other bright spirits who made my visit to Boston so delightful. Arnold Lea occasionally visits me, and we recount our Boston experiences with great gusto—particularly the charming Williams' most interesting yarns.

Osler appears to have been the first physician of distinction in England to appreciate Macken-

zie's worth, and we learn from Cushing's *Life of Sir William Osler* that very shortly after he settled in England, in July, 1905, he made a visit to Burnley. Of this, Mackenzie wrote Cushing. "One of Osler's great charms was the kindly interest he took in obscure workers in any field of medicine, and in 1905 when I was a general practitioner in a remote town in Lancashire he paid me a visit; and though my work was not that in which he was directly interested yet his appreciation was in itself a very great encouragement." Mackenzie told me that he had demonstrated to Osler at that time a case of mitral stenosis in which the typical presystolic crescendo murmur had disappeared as a result of paralysis of the auricle,—indicated by an absence of an *a* wave in the venous tracing,—but that he could not convince Osler of the correctness of his observation.

Possibly about the same time, but probably a year or two earlier, Mackenzie received a visit from the great Dutch physician, Wenckebach, whose contributions to a knowledge of the arrhythmias rank with his own. In Wenckebach's monograph on this subject published in 1903 he gives Mackenzie great praise. The latter in turn thought so highly of Wenckebach's work that he induced a Burnley ophthalmologist, Dr. Snowball, to translate the German text into English, and secured its publication. This book, well printed and attractively bound, probably had a very small sale, because the general medical world at that time knew too little of the subject to appreciate its importance.

Osler was also the first to bestow praise on Mackenzie at a large medical gathering. At the Congress of American Physicians and Surgeons, held in Washington in May, 1907, in the course of an address on "The Evolution of the Idea of Experiment in Medicine" he said, "In every country there will be found strong men like Weir Mitchell, Mackenzie of Burnley, and Meltzer and Christian Herter who find it possible to combine experimental work with practice."

Mackenzie probably made the bold decision to settle in London in the hope that he could find able young men who would use the new methods he had devised, and he doubtless thought that if he were located in a large medical center he would have greater opportunities for carrying on investigations with the aid of such outstanding men of science as Cushny, the pharmacologist, and Arthur Keith, the anatomist. He would also be in a better position to acquaint the medical profession with the new knowledge of heart disease that he had brought to light.

Mackenzie was a true missionary of science, with a zeal that could not be quenched by opposition,

or what is more difficult to bear, indifference. In Manchester, the nearest medical center to Burnley and the seat of a medical school (Owen College), he tried in vain to get his methods adopted. He once told me that for fifteen years he attempted to interest the physicians in Manchester by giving papers and demonstrations. There would be no discussion. After the meeting he would find himself alone in the room. He would pack up his polygraph and tracings and retrace his steps to Burnley, forty miles distant.

The next letter I have preserved was written on November 5, 1907, shortly before he left Burnley to work in the larger field of London.

I was glad to hear from you again, and pleased with the idea that you intend taking up heart work. I am afraid, and yet for you, rather glad, that you won't do this, for the reason it involves a lot of drudgery and wearisome work that will take up far more time than you can spare. You are now getting so busy and interested in other matters that you will not find the time. And yet it is a wonderful field it has opened up. These recent methods are generally assumed to be of interest in an academic sort of way but of no practical utility and recent writers of books refer to them in such a manner that this impression is encouraged placing the new methods in a sort of appendix. Now I find nothing so helpful in diagnosis, prognosis, and treatment as the application of the principles derived from them. I am just now in the throes of a book, where I attempt to bring them in the every day practical examination of patients. The undertaking involves [such a] breaking away from the well established methods of book making that I sometimes despair of doing justice to the subject. When you come to London I hope to be able to demonstrate the essentially practical nature of these new methods. I wish, however, it had been Burnley you were coming to, for I have here such a selection of cases that astonish all who visit me.

My reason for writing you so soon is that I want to know if you have kept the heart of that lad with mitral stenosis. I have now I think been able to establish that in mitral stenosis the rhythm of the heart starts at a node of tissues at the beginning of the a-v bundle. Some of the evidence is in a reprint I post with this. In certain rare cases there is a tendency for this rhythm to start for brief periods giving rise to attacks of paroxysmal tachycardia though the rate may not be greatly increased. I have had several of these cases and a very typical one died in an attack, but I mislaid the heart after noting the mitral stenosis. I feel fairly certain that if your patient's heart be microscopically examined there will be found an extension of the sclerotic process affecting the a-v bundle. Do you think you could get it examined?

It is curious your letter came when I was constructing a chapter on heart affections in neurotic people and had just finished the chapter on heart block which I take to be the cause in your man with the slow pulse. I have to go some forty miles tomorrow to see a very similar case. The cause I suspect is an extension of the sclerotic process cutting the bundle in two. When you come to London I will take you to Keith—one of the Lord's anointed—and he shall show you all these things.

I have had two most excellent articles from Hewlett, and I shall write him for a reprint of the articles you mention.

I had a wealthy lady with rheumatoid arthritis in her arm and she wanted another opinion so we motored down to Oxford and saw Osler. He was as chirpy as ever and told me you were going with him and Gibson to Vienna and he asked me to join the party. I fear it is one of those good things that will be denied to me.

We go to London on December first so if you are so good as to write to me, address me at 17 Bentinck St. W., London.

My wife bids me say she expects you to put up at that address, i.e., if you will be content with homely fare after the sybarite enjoyments of Oxford. I shall introduce you to these rare spirits—Cushny, Keith, Starling, Bayless, etc. You would do better work in London than with Krehl.

The book he was then writing, *Diseases of the Heart*, was published in the fall of 1908 and proved extraordinarily successful. He attributed to it the rapid growth of his practice in London after the first barren year. It was translated into German, French and Italian.

This letter reveals that at that time he was absorbed with the problem of the cause of the absolutely irregular pulse now known to be due to auricular fibrillation, and that he thought he had evidence that in this type of irregularity in mitral stenosis the rhythm begins in the auriculo-ventricular node; he therefore termed this rhythm "nodal rhythm." Although he then mistook its true nature, he recognized and differentiated this important group of the arrhythmias at a time when leading clinicians in Europe and America were ignorant of its existence. For years the pulse in those cases was described as intermittent and irregular, and no attempt was made to distinguish this arrhythmia from the irregularity of the pulse due to frequent extrasystoles. Mackenzie, on the other hand, stated in a paper published in 1908 that he had studied no less than six hundred cases of what is now called auricular fibrillation.

As early as 1898 he observed in a case of mitral stenosis that he had followed for six years that the auricular wave in the liver pulse, present in all previous tracings, disappeared, as did a "long murmur running up to and ending abruptly in the first sound, heard only at the apex." At the same time the pulse became irregular. He concluded that the patient had developed auricular paralysis. At the autopsy the auricles were greatly distended into thin-walled sacs "with a few strands of muscular fibres scattered over them." This explanation of the disappearance of the a wave in the venous pulse as due to paralysis was nearly correct, for the auricle, the seat of fibrillation, does not contract. The relation is certainly

close between the motion of a muscle that consists of a fine quiver and an actual paralysis. It is clear that Mackenzie's theory of nodal rhythm advanced in 1907 was much farther from the truth. He held to this theory until late in 1909, when Thomas Lewis showed that auricular fibrillation was the cause of the persistent irregularity. It was Mackenzie who stimulated Lewis to investigate the subject with the newly invented electrocardiograph. In the fourth edition of his textbook Mackenzie returned to his original designation, namely, paralysis of the auricle.

The next letter, dated January 31, 1908, was the first I received after he had moved to London. The book was nearly completed, and he was already in close touch with Cushny, who was investigating a subject of great interest to Mackenzie, namely, ventricular rhythm. This was the term applied to the contractions originating in the ventricles in cases of heart block.

Your letter relieved me. I had been told you were coming over in March and as I will have to go to Scotland until the end of March I am so afraid I might miss you. I am certain to be here all April, and will be free from the writing of my book which has engrossed all my energies for the last ten months and particularly so the two months I have been in London. I look forward to seeing you and will hope to make your visit here interesting and profitable. I regret, however, that I don't have any patients to show you, as there is absolutely no likelihood for my getting such a hospital appointment as I would care to accept, but I have one or two disciples and we may get the use of their cases.

I am glad your article for Osler is finished and I shall look forward to its perusal. I was interested in the fact that you had suggested His's bundle as the seat of irregularity. I remember a lecture of Clifford Allbutt in 1902, I think it was, in which he suggested "Gaskell's bridge" as the starting place. What a pity it was that you did not seek to carry out the suggestion by seeking for proof. The more searchers we get the nearer we will get to the truth. Though I got the idea about 1904, I am not quite convinced of its truth, for it has not been proven, and in my papers I make the suggestion boldly in order to stimulate others; and if they prove me wrong then I will rejoice at the discovery of the truth. In my book I do not take a strong standpoint, only suggest. I may say Professor Cushny has been able to produce the "ventricular rhythm" in dogs by aconitine and we are trying to get to its origin experimentally—but the difficulties are very great.

If you are really interested I think I will be able to start you well on your way during your stay with us. I am certain you will be pleased with the definite results you can get, especially when you have been engaged in the extremely difficult problem of metabolism.

I am glad you liked Starling. He is a delightful man as well as a great physiologist. You are right in regard to our physiologists. They are splendid men and so simple. Gaskell, for instance, is far ahead of any physiologist; even Engelmann, who has such a reputa-

tion, has only followed Gaskell's lead. It is the man who originates that is the great man, not the man who does the spade labor. Gaskell's work on the heart will place him next to Harvey in my opinion, and his work in the nervous system will give him a very high place in science.

I have been reading a lot of heart work lately, and I like the English better than the French and German. You will find that clinically and for practical recognition of conditions that writers like Broadbent are far ahead of any others. I have been reading Krehl, Romberg, and Hoffman and I am greatly disappointed in their clinical work. They are besides extremely badly informed of what other writers are doing and though they quote a lot of names you will find on deeper inquiry that the names are of little value and the reasons for their quotation . . . [illegible writing]. I don't want to flatter you but the papers you sent me were far more suggestive than any of these authors. They take such narrow views and expressed their views as if they were the only possible ones, and no more to be said. This "finality" particularly by French and German writers is one of the most amusing things I came across. I hope when you come here you will realize the strength of English clinicians.

In a paper published in 1904 I³ had said that a fatty change "in His' bridges, which transmits the contraction from auricle to ventricle, might impair the action of the heart while an equal fatty alteration elsewhere would not. Unfortunately no exact data are available. . . ." Mackenzie was right in criticizing me for not acting on the suggestion I put forward. I did not know at the time that, five years before my paper appeared, Wenckebach and His had independently suggested a lesion of the auriculoventricular bundle as the cause of heart block.

From July, 1906, onward I had under my care a Mr. Baker, who, because he lived near Boston, was referred to me for treatment with artificial "Nauheim baths," by my friend Dr. John H. Musser, whom he had consulted in Philadelphia. These were carbon dioxide baths of various strengths given at definite temperatures. Dr. Musser believed that the patient had beginning myocardial disease, and at that time it was generally held that carbon dioxide baths would strengthen the heart muscle. On September 1, 1907, Mr. Baker noticed slight difficulty in breathing, and his pulse rate, which had been normal, suddenly became slow. It was 38 to the minute when I examined him two days later, and subsequently I counted it as low as 28. After the bradycardia had continued for four months, the rate returned to normal. Because the patient was going to England in the spring of 1908, Dr. Musser agreed with me that it would be a good idea to have Dr. Mackenzie examine him. We thought he had had heart block, but definite proof was lacking. Mr. Baker was then fifty-three years old, the pulse rate

was normal and he was free from symptoms. I mention his name because Dr. Mackenzie referred to him repeatedly in his letters. He evidently never lost interest in his patients or forgot them. In the spring of 1924, sixteen years after he had examined Mr. Baker and less than a year before his own death, he wrote a note expressly "to hear how Mr. Baker had gone on."

I was present in Mackenzie's consulting room at 17 Bentinck Street when he examined Mr. Baker. Not much time was spent on the history or physical examination, and only a very few notes were made. The patient's pulse was regular and about 79 to the minute. Soon the ink-writing polygraph was brought out, and a continuous tracing of the radial and jugular pulse was made. Yards and yards of the paper ribbon passed through the machine and accumulated in wide loops on the floor. Mackenzie wanted to get the information he thought might be furnished by an extrasystole,

conductivity lead me to agree with your diagnosis of the condition when the pulse was slow — namely, that Mr. Baker had a transient heart block. On this point I will be able to speak with more certainty when I see the tracings. My diagnosis, — cardio-sclerosis, affecting the muscle wall, and extending to and partially destroying the a-v bundle.

The tracings, the arrival of which he was awaiting, had been made by Dr. George W. Norris, then Dr. Musser's assistant, at a time when Mr. Baker had bradycardia. On April 14 he wrote that the tracings had been received, and that they

confirm my diagnosis and render Mr. Baker's case one of great scientific interest, as few cases have such a good history of the change and confirms me in the view I have expressed in my book of the relationship of extra-systoles and "nodal rhythm" to heart block.

The prognosis is by no means bad, if he will be content with a crippled existence. If you should have to write Dr. Norris, tell him I think highly of the manner he has analyzed the tracings. There are not

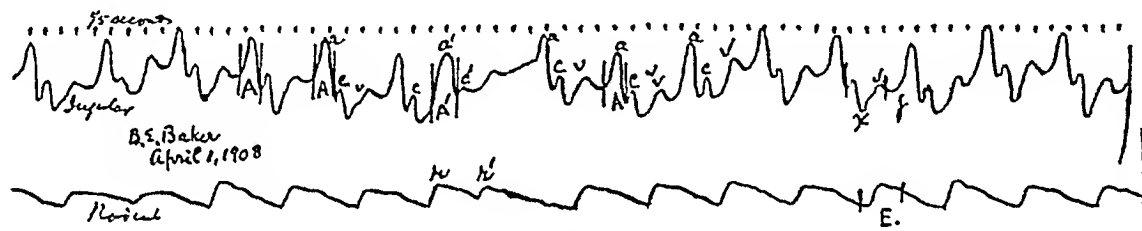


FIGURE 1.

Tracing made by Dr. Mackenzie of a case of partial heart block.

but the pulse continued perfectly regular for many minutes. Finally after about twenty minutes, one extrasystole appeared on the tracing. Although the pulse was traced for some time longer, no other extrasystole was obtained. Figure 1 shows the polygraph tracing recorded at that time, April 1, 1908. The analysis made by Mackenzie was contained in a letter I received from him after I reached Heidelberg:

I promised to send you the tracing of Mr. Baker's auricular extra-systole.

The features brought out in the tracing are, a larger venous pulse than usual, and associated with it an increase in the heart's dullness, indicating a certain degree of dilatation. The tracing shows an increase in the a-c interval, slight but distinct. Normally at this rate of the heart's action the a-c interval rarely exceeds one fifth of a second, here the intervals (spaces A) are distinctly more than one fifth. The extra-systole is of auricular origin (a' in the jugular tracing). It is followed by a carotid wave, c', which I recognize as carotid because it is the same distance apart from the preceding wave, c, as the radial extra-systole, r', is apart from the preceding radial beat, r.

The a'-c' interval (space A') is greatly increased. This increase is rare in auricular extra-systole and is a further evidence of the impairment of the conduction of the a-v bundle. These undisputed evidences of delayed

six men in the United Kingdom that could have done it.

P. S. I have kept the original intact and copied in accurately the auricular extra-systole. If the American tracings are not of use to you I would like them, but you should keep them and publish a full account of this case in which case I shall let you have the original tracing we took together.

During the following years Mr. Baker continued to have recurrent attacks of complete heart block. Pulse tracings that I took during one attack were sent to Mackenzie with those of other cases of abnormal rhythm. On April 4, 1909, he wrote:

Your interpretation of the tracings is correct in each case. Note the difference in the a-c interval when there is heart block and when there is not (space A). I am sorry to hear of his recurrent attack. I shall look forward to the results of your endeavor to treat them. I expect a quiet God-fearing life will be best. . . . I got your letter yesterday and on the same evening I had an identical tracing of heart block sent me for my opinion from Sheffield. . . . If you can spare a bit of Baker's tracings I shall be glad to have it.

The statement that he looked forward to my endeavor to treat the attacks has a hidden meaning, which shows his tolerance to his friends who

held views regarding treatment with which he strongly disagreed. He knew that I believed that carbon dioxide baths strengthened the heart, and that I was employing them in the treatment of Mr. Baker. When Mackenzie was in Boston in 1906 I showed him the record of a patient with congestive heart failure who recovered after a course of such baths. He was quite right in failing to consider this favorable result as valuable evidence. I remember to this day his reply "Patients usually recover from their first attack of heart failure, no matter what treatment is employed." I pointed out to him that Krehl and Romberg, who were regarded as great authorities in heart disease, advocated treatment by carbon dioxide baths in their writings. He told me that I quoted Krehl and Romberg too much. I should make my own observations, do my own thinking and draw my own conclusions. I had worked under Krehl and doubtless was influenced by his teachings more than I should have been.

In his textbook, *Diseases of the Heart*, Mackenzie inserted a strong condemnation of the Nauheim baths. At that time they had a high reputation in England. He told me at the time he was writing his book that a professional friend who had read it in manuscript urged him to omit the criticism. This he refused to do. He had visited Nauheim, and did not condemn the method without reason. In the printed text he said, "Though I enter into this matter reluctantly, I conceive it nonetheless a duty to give my views on it, particularly as I am impressed with the injury done to individual patients through the unmerited reputation of the Nauheim baths among the medical profession." Mackenzie was right. The blast he directed against the Nauheim baths, natural and artificial, was effective, and nothing in their favor has supplanted the evidence he assembled against them over thirty years ago. Their use, in this country at least, lessened rapidly, and this was due in no small part, I believe, to Mackenzie's vigorous condemnation.

Before dismissing the case of Mr. Baker, an incident may be related that throws light on Mackenzie's attitude toward the financial side of medical practice. He was free from mercenary motives in moving to London. The character of many an able physician has been marred by an "itching palm." Not so Mackenzie. Mr. Baker was a wealthy manufacturer. He was, I think, the first patient referred to him from America, and he came on the recommendation of one of the leading physicians in the United States, Dr. John H. Musser. One day on the steamer going to England, Mr. Baker asked me how much Dr. Mackenzie

would probably charge him. I told him I did not know, but since Mackenzie was an international authority I thought he might rightly charge him any amount between \$75 and \$150. Mr. Baker seemed relieved and said that would be satisfactory. He added, "I feared he might stick me \$500." As I have already said, his total income the first year in London was only £114, hence, his receipts must have been very small up to the time I brought Mr. Baker to him. One morning after breakfast, I think on the day of the consultation, I asked Dr. Mackenzie how much he was going to charge my patient. "Three guineas is my fee." "If you do not charge Mr. Baker more than that," I replied, "it will make an unfavorable impression upon him. He will doubt whether I have brought him to a great heart specialist. He expects to pay you much more than that, and your opinion in his case is worth much more." It took much persuasion to induce Dr. Mackenzie to raise his fee. I think he charged Mr. Baker \$50 or \$60, I know it was less than the minimum figure I had mentioned. I did not know at the time how much he needed money. Lady Mackenzie told Mackenzie's biographer, Dr. R. MacNair Wilson,⁴ years later, "We were really and truly poor people." Their hospitality was unbounded. On two visits to London in 1908 I was their house guest all the time I was in the city. In the many talks I had with Mackenzie on those occasions he never expressed any fear that his London venture might end disastrously because of his failure to build up a practice. In fact, he never talked about financial matters.

After he had been in London a couple of months, Mackenzie had written me that there was "absolutely no likelihood for my getting such a hospital appointment as I would care to accept." But on May 24 he wrote "I have the offer, which I will probably accept, of having charge of wards in a hospital during August and September, beginning about August 7th. I wonder if you could delay your return to London until after August 7th, and come and work a short time with me in the wards. Turn this over in your mind and let me know." And on June 8 he wrote, "So far as I can see at present I shall get the wards about August 7th and if so we can have two or three days' discussion on the points that have arisen in your work in Heidelberg." He did not get the control of any wards, and this must have been a keen disappointment, but he never offered any explanation to me. He had learned, in Osler's words, "to consume his own smoke." I think he must have referred to the wards at the London Hospital under the care of

Henry Head, who was on a vacation at the time. We did visit the hospital one day, traveling to the east end of London on a bus. Mackenzie went to the basement of his home and smoked some tracing paper just before we started. He introduced himself to the sister in charge of the ward and said that Dr. Head had given him the privilege of examining the patients on the wards. We had a cool reception. I suspect Dr. Head had neglected to speak to the nurse. She simply bowed, and we began to walk from bed to bed until, without assistance, we found patients with heart disease. Mackenzie took out his polygraph and began to make tracings of the pulses of patients who had irregular rhythm. There was a house officer on the opposite side of the ward, but he did not offer to help us. In fact, he seemed to regard us with some suspicion. Finally the sight of the moving levers recording the radial and venous pulse aroused his curiosity. He crossed the ward and asked Mackenzie if that was a Hill-Barnard blood-pressure apparatus. "No," was the reply. "It is called a polygraph and was invented by a man named Mackenzie." Evidently disappointed, the young doctor walked away without another word. The polygraph and its inventor meant nothing to him. Only a few years later a new department for cardiac disease was created for Mackenzie in this same hospital. His nomination was made by no less a person than Lord Dawson of Penn, the King's physician.

In his earliest paper on the venous pulse, published in 1892, Mackenzie believed that the ventricular type, as he termed it, indicated dilatation of the right ventricle and tricuspid regurgitation. He held this view for years, in fact until he found that it was always associated with what he called "nodal rhythm," auricular fibrillation. In April, 1909, he wrote:

The variation in the jugular pulse in undoubted tricuspid regurgitation puzzles me and I can only dimly and unsatisfactorily speculate as to the cause. If you can settle the matter it will be a good piece of work. You can have no one better qualified to help you than Professor Porter. I think I did wrong to follow Frey's description of the auricular pressure. I think now that Porter is the truer. Some day I hope to apply his results to the venous pulse. I have already got some helpful tracings that way. Remember me kindly to him.

The next letter dates from the St. Andrews period and was written in April, 1924, only four months before ill health compelled him to retire to London. In spite of physical disability his mind turned incessantly to advancing knowledge and combating error.

I would strongly urge you to keep your instrument in good condition, because the polygraph is of far more use than the electrocardiograph. In the reprint upon cardiology which I sent you, you will see how much stress I am laying upon the output of the heart, and that it can only be registered by the sphygmograph, the electrocardiograph giving no information in regard to this important point. When you come to think of it, it is the capacity of the heart to supply the tissues with blood which we want to know, and that can only be done by ascertaining how the circulation is maintained in the body, and for this information we are dependent upon the patient's response to effort—the state of the pulse, and the presence or absence of signs of dropsy, etc. These essential matters are utterly beyond any instrument limited to the heart beat.

I am carrying the matter further than is represented in the reprint, for the small imperfect beats are those which give rise to heart failure, and it is by their suppression that digitalis proves so beneficial.

I see the old notion of operating on mitral stenosis is being revived. I wish surgeons would think of what the effect is of cutting scar tissue anywhere. It is only a small number of patients in whom the stenosis is a serious matter. The danger lies in the damage to the muscle, and almost to a certainty the cut in the scar tissue will unite again.

Another absurd piece of surgery has been carried out by the cutting of the sympathetic in angina pectoris. Of course, if a patient has gout in the big toe, the cutting of the afferent nerve will relieve the pain, but it will not cure the gout. If you think for a moment of the state of those hearts which are figured in my book on "angina" with the damaged coronary artery, and the great mass of damaged muscle, what on earth is the good of cutting the sympathetic? The pain may diminish, but its presence is actually beneficial, in that it provides a measure by which the patient can tell how much effort he should undertake. It is not the pain that is dangerous in angina pectoris. No person ever dies of pain. The pain only indicates the presence of some morbid state, and consequently, by relieving the pain you don't remove the morbid state. I have given the details of patients in my book to show that the pain or the angina itself is not necessarily a dangerous complaint, and if you read the history of some of these cases, you will see that people with angina can live as long as the average.

Partly as a result of Mackenzie's teaching, and partly as a result of personal observation and experience over a period of ten years, I was convinced that the best treatment for angina pectoris was prolonged bed rest. Knowing that Sir James, although afflicted with frequent attacks of angina, had been keeping at work, I wrote him of the excellent results I had obtained and urged him to seek the advice of his friend, Sir Clifford Allbutt, who was an ardent advocate of the bed-rest treatment and who had acquainted me with his success. He wrote that even in a "terrible case of angina pectoris, great relief if not cure" resulted from six months in bed. When Sir James Mackenzie received my letter he had only recently returned to

London and, as I learned later, was without medical care. It is always a hazardous matter to give unsought advice to a sick friend, especially if he happens to be the victim of a disease of which he is acknowledged to be the greatest living authority.

The following letter was written from London on September 10, 1924:

It is very good of you to write to me, and I appreciate very much your interest and your kindly suggestions. Your principle of treatment appeals to me. I have endeavored to follow it.

There is one danger, however, in a rule of thumb treatment in that it is apt to be used indiscriminately, and therefore to submit patients to treatment who do not need it, and fails to treat others who do not benefit by it but who are even made worse by it. In angina pectoris there are present morbid changes in the heart such as a narrowing of the coronary artery. This restricts the power of response of the ventricle so that effort produces pain. For a long time before pain arises there may have been persistent exhaustion which rest in bed does much to restore, but there are many circumstances other than effort which give rise to the pain. In my own case my first attack of pain was in 1908, and it arose in consequence of digestive indiscretion. I never had another attack of pain until two years ago, and then it was due to being chilled on a railway journey. For all these years I have known that the liability to pain was there, and ten years ago I used to be warned by the sense of constriction on going up hills, but invariably slowed down or stopped and the pain was never induced. During the war I led the most strenuous life that ever I had done, with out pain. Until eighteen months ago I played golf regularly, but on walking in the links, about a mile, I would have to stop every five hundred yards, caused by the constriction. Nevertheless I would play a round of golf without the slightest inconvenience.

The two great causes of pain in my case are exposure to cold, and mental excitement. When I avoid these I have no pain. I cannot walk now more than a few yards before I get the warning, but as I always stop I do not have severe pain from this cause.

All this means that my coronary arteries are slowly but surely becoming occluded.

I have written this in order that you may see the principles which we are trying to establish at St. Andrews particularly in regard to the response to effort in the circumstances that lead to such attacks as those of angina. Don't you think it a curious thing that notwithstanding the enormous amount of investigation that has been carried on that we are still as far from understanding the structures and processes concerned in the production of pain as were the pundits of the dark ages? Worse than that we don't even know what steps to take to get this knowledge. That is one of the problems I have been labouring at for forty years, and there is scarcely a physician who will take the trouble to find out what tissues, when stimulated, are capable of giving pain. In palpating the abdomen physicians and surgeons continually meet patients who complain of pain when pressure is made. No one, practically, takes the trouble to find out the structures which are being pressed upon which give rise to pain. Yet all physicians and surgeons resent the suggestion that they do not know how to palpate intelligently the abdomen.

I write you this because I know you like to face

problems. My wife and daughter join me in sending very best regards to you and your wife.

His last letter, dated November 18, 1924, was written only nine weeks before his death:

I was much interested in your letter and I am glad you propose attacking the problem of angina. Your suggestion of publishing the details of a series of cases is admirable. I have felt greatly the absence of such observations, for everyone who writes on the subject gives either particulars of a few cases which are quoted merely to support his own view or generalizations without proof. It was to provide a wide survey and to give the evidence for every statement that I cited so many cases.

But from your letter I see a danger in using them statistically. I had notes of 2000 cases. Half of them were too imperfect for use. Of the other 1000 I had full notes which enabled me to divide them into groups chiefly of three kinds, according to their gravity—or rather, their duration. There was a group where the complaint advanced slowly and the individual reached in advanced age. A second group where the disease progressed with greater rapidity and a third group where the progress was rapid and the patient died about middle life. The first group was by far the largest—700 or 800. The others much smaller. In the cases recorded in my book I give types of the groups independent of the number in a group. The largest of the groups were more of a type so that a few cases only were required. Of the others because of their gravity and individual character relatively more illustrative cases were given.

There was no clear dividing line between the groups. The grouping was done for convenience. Now if you take your series of cases and give their history and start comparing them with those I have given with which group will you select? It will be perfectly easy to select one of your cases which had, after an attack of angina pectoris, led an energetic life for ten and fifteen years and compare it with one of mine who died a few months after his attack and attribute the improvement of your case to your treatment, and the death in my case to the lack of your treatment. This is the fallacy of statistics.

I have many cases I put to bed and keep them there for weeks and months, but I discriminate. Look at the diseased hearts pictured in my book and ask yourself what conceivable treatment is likely to restore these hearts. Such conditions must have taken many years to develop. Discrimination can only come through recognizing the rate of the progress of the diseased condition and then can only be drawn by *estimating the response to effort*—i.e., by the amount of effort the patient can undertake without distress. Rate of pulse, blood pressure, etc., afford no help in the matter.

I get along quietly, taking as much exercise as I can without distress. I have only laid up one day, yet it is sixteen years since my first attack.

The clinical history and a careful and thorough study of Sir James Mackenzie's heart made at his request were published last year by Dr. David Waterston⁶ in the *British Heart Journal*. In the letter written four months before he died Mackenzie said, "All this means that my coronary

arteries are slowly but surely becoming occluded." The autopsy proved the correctness of this statement.

To my personal recollections and to this collection of letters I add in conclusion the fine appreciative sketch of this great man by the one whose name is closely united with his in the development of the clinical pathology of the heart. In a memorial tribute that appeared in the *British Medical Journal*, Sir Thomas Lewis⁶ said:

It was in 1908 and shortly after he migrated to London from his old home and practice at Burnley that I first came to know Mackenzie personally. While it was never my privilege to work under his supervision, yet he extended to me, though many years his junior, a friendship which soon became intimate and highly prized. I found in him during these years before the war, when we were in almost daily and personal communication, a man whole-heartedly devoted to the search for the knowledge of disease, and eager, most eager to impart his spirit and conceptions. He was an exceptionally vigorous and strong personality, intolerant of statements founded on tradition, trenchant and acute in criticism, rich in personal experience, combative in argument, but open nevertheless to conviction on all questions without reserve. He saw, as few or none of his day saw, where clinical knowledge ends and ignorance begins, and never hesitated to define the limits of his knowledge; and he was the first authority in clinical medicine on whose lips I frequently heard the words, "I don't know." To him diagnosis, the affixing of a temporary label, gave little

satisfaction; his patient still contained his problem or problems. Mackenzie's mind could not rest on the known, but turned incessantly at each and every hour of the day to the unknown, and in perceiving and defining the unknown he displayed a masterly power. To know Mackenzie intimately was to imbibe independency of thought; none could go to him seriously to discuss, and, surviving the brusque shocks of that first interview, return without a growing inspiration and stimulus. For he possessed a gift of stimulating others in unusual degree.

As a man he was hard headed and warm hearted, quick in temper and in sentiment, genial and hospitable, possessed of an invigorating, blunt humor. Schooled by long experience in the sensibilities, reservations, obstinacies and frailties of patients, he was an astute and shrewd physician, who rarely failed to inspire an unlimited and merited confidence.

This briefly of his practical work as I knew it; as a bedside investigator he ranks in my judgement as the first of his time; he has gone from us to hold a place in the history of British medicine by the side of Sydenham, Stokes, Graves, Addison and Bright, and he will live in memory as not the least of such men.

30 Bennet Street

REFERENCES

1. Obituary. Sir James Mackenzie. *Lancet* 1:257, 1925.
2. Wenckebach, K. F. *Die Arrhythmie als Ausdruck bestimmter Funktionsstörungen des Herzens*. 193 pp. Leipzig: W. Engelmann, 1903. Pp. 28, 48, 51, 87.
3. Pratt, J. H. On the causes of cardiac insufficiency. *Johns Hopkins Hosp. Bull.* 15:301-309, 1904.
4. Wilson, R. M. *The Beloved Physician: Sir James Mackenzie*. 316 pp. New York: Macmillan Co., 1926. P. 193.
5. Waterston, D., Orr, J. and Cappel, D. F. Sir James Mackenzie's heart: with an account of his clinical history and notes on the pathological histology. *Brit. Heart J.* 1:237-248, 1939.
6. Lewis, T. Tribute. *Brit. M. J.* 1:243, 1925.

TRANSURETHRAL ELECTRORESECTION AS OPPOSED TO PROSTATECTOMY*

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A DISCUSSION of the relative merits of two operations, entirely different in principle yet both designed to accomplish the same result, should be based on a consideration of the pathologic condition for which relief is sought. This is particularly true when obstruction at the bladder neck is the subject of discussion, for such obstruction may be caused by widely different processes.

Randall,¹ in a study based on the autopsy findings in 312 patients with prostatic obstruction, found 17 carcinomas, 57 fibrous bars, 31 glandular bars unaccompanied by lateral-lobe hyperplasia, and 207 cases in which hypertrophy of the lateral lobes existed alone or in combination with one of the preceding conditions.

A classification of the types of prostatic obstruction such as Randall has presented is of primary

importance in any discussion of transurethral resection as compared with prostatectomy. Obstructive conditions at the bladder neck are of two types: the enucleable and the nonenucleable. Carcinomas, fibrous bars and glandular bars unaccompanied by lateral-lobe enlargement, which were found in 33 per cent of Randall's series of bladder-neck obstructions, do not lend themselves readily to enucleation, as anyone knows who has attempted to remove them by this method.

Hypertrophied lateral lobes, on the other hand, may be cleanly and easily removed, through either suprapubic or perineal approach, by the simple process of breaking through the thin mucosa of the prostatic urethra at the point where it passes from the projecting lobe onto the roof of the urethra, and sweeping the finger along the line of cleavage between the hypertrophied mass and the prostatic capsule. This leaves a smooth, bowl-shaped cavity; its wall consists of compressed pros-

*Presented at the annual meeting of the New England Surgical Society, Poland Spring, Maine, September 28, 1940.

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tatic tissue 2 or 3 mm thick, and at the upper and lower poles it narrows sharply to form the entrance and exit of the prostatic urethra (Fig 1)

That it might be possible to relieve bladder-neck obstruction of the fibrous type by transurethral methods has long been known, and Ribb¹²



FIGURE 1 Large Prostate with Easily Enucleable Lateral Lobes Lateral lobes partially enucleated (Reproduced from *Surgical Pathology of Prostatic Obstructions*¹ [p 59] by permission of the publisher)

has written a good historical review of the subject. One hundred years ago Mercier³ devised an instrument for the excision of bars at the vesical neck. Botuni⁴ in 1874 developed for this purpose an instrument resembling a lithotrite, the male blade of which was heated by a galvanic current. In 1909 Young⁵ introduced his "cold punch," which Caulk⁶ later modified by the addition of a cautery blade and a system of lenses.

Stern⁷ succeeded in applying high frequency current to the transurethral removal of bladder neck obstructions. His instrument was improved by Davis,⁸ who in 1931 reported 200 transurethral resections. The Stern-Davis resectoscope was superseded by the McCarthy⁹ resectoscope which has been the instrument most widely used in this country. A wire loop, set at right angle to the long axis of the instrument, is charged with a high-frequency current that enables the loop to cut through tissue and to coagulate as it cuts. The

operator moves the loop backward and forward by means of a lever, and can change the character of the electric current by means of a foot switch.

The Mayo Clinic has employed a different principle in transurethral resection, the obstructing tissue is removed with a cold punch, and the electric current is used only for coagulating bleeding points. This principle is sound, I believe, and in the early days of resection, when tissues cut by the McCarthy resectoscope were often considerably "overdone," it constituted a distinct advantage in favor of the cold punch. Recent developments in high frequency machines have given us a current that cuts with very little coagulation, whereas the Thompson¹⁰ resectoscope used at the Mayo Clinic

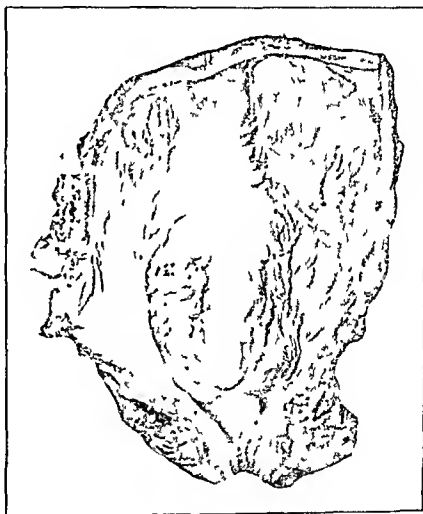


FIGURE 2 A Moderate-Sized Solitary Subcapsular Hypertrophy (Middle Lobe) Suitable for Transurethral Resection (Reproduced from *Surgical Pathology of Prostatic Obstructions*¹ [p 135] by permission of the publisher)

has so small a field of vision that the operator accustomed to the magnified view of the bladder neck given by McCarthy's Foroblique Lens finds the Thompson instrument almost impossible to use.

For the management of those types of bladder neck obstruction that are not readily enucleable, transurethral resection is admittedly the best method. One exception should be made; in certain early carcinomas, the total removal of prostate, vesicles and bladder neck as described by Young¹¹ offers a fair chance of cure, whereas re-

removal of the obstructing tissue by the resectoscope leaves behind that portion of the gland, the posterior lobe, in which from 75 to 80 per cent of prostatic cancers have their origin. Space does not permit the presentation of arguments in support of this rather dogmatic statement, but it is made on the basis of my experience with over 70 total perineal prostatectomies.

Although almost all urologists are in agreement as to the value of resection in nonnucleable obstructions, there is wide divergence of opinion as to its place in the removal of lateral-lobe hyper-

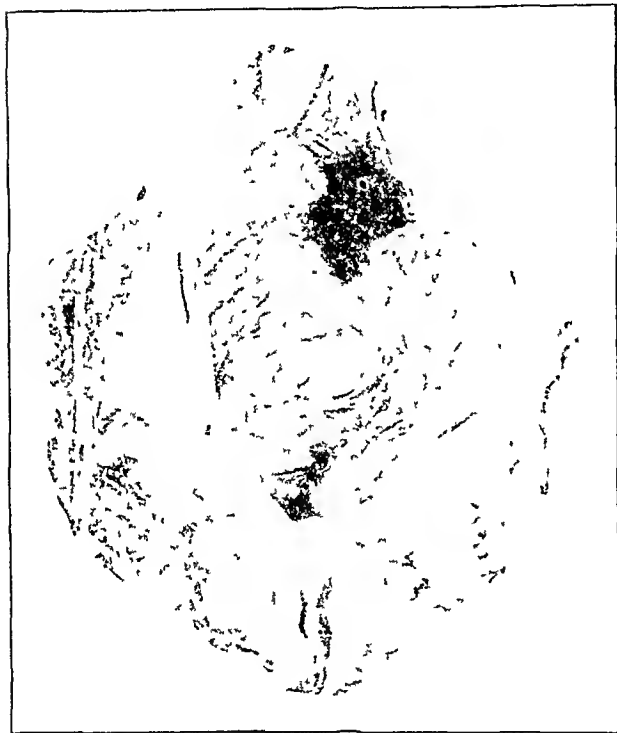


FIGURE 3. *A Fibrous Median Bar, Not Enucleable but Readily Removed by Urethral Punch or Resection. (Reproduced from Surgical Pathology of Prostatic Obstructions¹ [p. 201] by permission of the publisher.)*

trophies. Most writers agree that small hypertrophies—let us say those not weighing over 20 gm.—may be sufficiently well removed by resection to promise a good result. When the larger hypertrophies are concerned, there is a parting of the ways. Some operators contend that practically any prostate can be resected, although two or more sessions may be necessary. Very few can remove over 50 gm. in an hour, and the leading advocates of resection warn against prolonging the operation beyond this time. Other operators believe that hypertrophies of more than 25 or 30 gm. can be removed more cleanly, more rapidly and even more safely by open operation.

In the early days of resection, surgeons were amazed to find that great relief of obstruction often

followed the removal of a few grams of tissue from the bladder neck. This was because the early cases were largely in the nonnucleable class. As larger prostates were attacked, it was learned that simply boring out a channel was not enough; incomplete removal of hypertrophied lobes often resulted in the extrusion into the urethral lumen of small adenomas. These sloughed, bled or obstructed urination. Recently leading resectionists have changed the name of this operation from "transurethral resection" to "transurethral prostatectomy"; they maintain that it is possible as well as essential to remove by transurethral methods the same amount of tissue that would be removed by enucleation.

I do not doubt that a few of the most skillful can approximate this objective, but the technical difficulties are many. The prostatic capsule is 2 or 3 mm. thick; to stop the process of resection at exactly the right depth all over the considerable area filled by good-sized hyperplastic lobes is practically impossible. If one leaves too much tissue, the operation may have to be repeated; if one cuts too deeply, the capsule is perforated and extravasation may result. Yet admittedly the operation is inadequate unless this almost impossible feat is accomplished. Actually, I believe, good clinical results are often obtained even if a considerable layer of hypertrophied tissue is left; this must be so, because we see many good results. The fact remains that the goal of this operation is practically unattainable.

Not so with open prostatectomy; as has been already pointed out, the removal of all the hyperplastic area is easily accomplished by following natural lines of cleavage. Why, then, is transurethral resection employed for those patients whose prostates are well suited for enucleation? The outstanding argument in favor of resection is its allegedly low mortality. In comparison with the mortality of suprapubic prostatectomy, this argument is well founded, but in comparison with that of perineal prostatectomy, it has no basis in fact. Johnson and Burns,¹² from collected series of statistics, found that in 4837 suprapubic operations the death rate was 12.4 per cent, whereas in 4370 perineal operations it was 3.3 per cent. Chetwood¹³ collected 27,000 cases of transurethral resection in which the mortality was 3.6 per cent.

It is true that in the hands of a very few specialists in resection the mortality is around 1 per cent, but against this we may set Bugbee's¹⁴ series of 233 suprapubic prostatectomies with a death rate of 0.8 per cent, and Young's record of 2800 perineal prostatectomies with a mortality of 2.8 per cent.

It is a significant fact that among those surgeons trained in perineal prostatectomy, not one, so far

as I know, has abandoned this method in favor of resection except in the nonenucleable type of obstruction.

The management of a condition that is so prevalent as the obstructing prostate cannot be concentrated in the hands of a few operators. Relief of prostatic obstruction will be attempted by practically all the eleven hundred members of the American Urological Association, and by numerous others less qualified for this type of surgery. Orr¹⁶ has shown that the mortality of transurethral resection has been much higher among those operators whose experience with resection has been limited to smaller series of cases.

My own mortality rate with resection versus perineal prostatectomy is definitely in favor of the latter. I have done resections on 200 patients. In the first 100 cases there were 6 deaths; 2 of these were in patients with cancer, 3 were in feeble or elderly persons who were had risks, and 1 was due to pulmonary embolus. In the last 100 resections there were 6 deaths attributable to the operation, as well as 1 death some weeks after resection from uremia and 1 from pyelonephritis. Three of the operative deaths were due to pulmonary emboli, 1 to upper respiratory infection, 1 to extravasation by the subtrigonal route and 1 to cardiovascular collapse. These figures are deplorable.

In the last 100 perineal prostatectomies that I have done, on ward as well as on private patients, and including several total prostatectomies, there were 2 deaths. One was that of a ward patient who entered the hospital because of cardiac decompensation and prostatic obstruction. His family physician insisted that he have his prostate removed, on the ground that neither cystostomy nor catheter life would be feasible. The patient died of a cardiac relapse four days after operation. I believe that resection would have been less dangerous, even though it had to be repeated, for the position required for perineal prostatectomy adds some load to the circulation. The other death was that of a man who bled more than usual and required transfusion. He made a good immediate recovery, but developed anuria and died twelve days after operation. Autopsy showed a tubular nephritis, considered by the pathologist to be the result of transfusion of improperly matched blood.

Another reason advanced for selecting the transurethral method has to do with the shorter stay in the hospital. One reads of patients discharged in less than a week after operation. In some clinics, this means that the patient is transferred to a nearby hotel, from which he is easily able to attend the outpatient department for daily observation. The possibility that secondary hemorrhage may oc-

cur about twelve days after resection makes it unwise to send these patients to their homes in other communities. I believe that the patient should be kept under close observation for at least ten days after operation; it is humiliating to have his own physician telephone to ask what he should do to stop the patient's bleeding. Second resections, which have to be done in 10 to 15 per cent of cases, lengthen the hospital stay.

Following perineal prostatectomy, patients stay in the hospital for two to four weeks. I seldom have one remain over three weeks unless some complication has occurred. Such complications almost always develop before the patient is discharged; the development of serious trouble after that time is rare.

It has been my experience that complete return to normal bladder function is slower in patients after resection than after open operation, although with increased familiarity with resection the results have been better. With cleaner and more complete removal of prostatic tissue, sepsis has been less troublesome. Urethral strictures develop after resection in a small number of patients. Nesbit,¹⁷ to avoid this, advises introducing the resectoscope through a perineal urethrotomy if the urethra is of small caliber.

Both perineal prostatectomy and transurethral resection may be followed by incontinence of urine. That which sometimes follows prostatectomy is almost sure to clear up within three months; I have had among my last 100 patients only 1 in whom control has not been entirely recovered. Although I have had no private cases of resection in which incontinence has persisted for more than six months, Davis¹⁸ tells us that the sale of penis clamps has increased from an average of 100 to 150 clamps for each year of the decade preceding 1928 to an estimated 1600 to 1700 for the year 1938. Since the period distinguished by this tenfold increase in the demand for clamps coincided with that in which transurethral resection developed, one might logically assume that incontinence has flourished *pari passu* with the spread of the latter operation.

Patients frequently ask whether transurethral resection gives as lasting results as does open operation. It is perhaps too soon to answer this question. Orr,¹⁶ from a study of 37 patients questioned or examined five or more years after resection, found that 33 had obtained both objective and subjective relief from their prostatic obstruction. It appears probable that if the resection is thorough, the relief will be as permanent as that after prostatectomy. After resection of a fibrous bar, lateral lobe hypertrophy may develop later, but

this cannot be considered an argument against resection.

These are, in brief, the advantages and disadvantages of transurethral resection as compared with open prostatectomy. I believe that for the surgeon who does an occasional prostatectomy, the suprapubic method is the safest. For the urologist who does a number of prostatectomies every year, it is well worth while to learn the perineal operation. The technic is really not difficult, although it is often so described. Perineal prostatectomy, and not suprapubic prostatectomy, is the true rival of transurethral resection.

No surgeon should attempt to do resections unless he has first-class equipment, which costs from eleven hundred dollars to twelve hundred dollars, and a well-trained hospital personnel who can carry out the details of postoperative care. To perform a resection well is far more difficult than to perform a good perineal or suprapubic prostatectomy.

Concerning my own attitude toward resection, I am definitely a selectionist. Approximately 45 per cent of the cases of prostatic obstruction that I see fall into the class for which resection seems the best method. These include the fibrous bars, carcinomas and small lateral-lobe and middle-lobe hypertrophies, and a few poor risks for whom resection seems the safest course. I find that I am much more satisfied if I remove the moderate and large hypertrophies by the perineal route. The operating time is less, complications are fewer, the mortality is lower. When I have finished, I know that the obstruction has been relieved and that I shall not have to tell the patient that he must make another trip to the operating room. There is definitely less mental stress for me, and a more complete and workmanlike job for the patient. Undoubtedly there are many urologists whose attitude toward resection is exactly opposite to mine.

Dr. George Brewster once said to me, "A surgeon should use that type of operation from which he can get the best results." This advice is essentially sound, and should be the criterion in the selection of a method for relieving prostatic obstruction.

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REFERENCES

1. Randall, A. *Surgical Pathology of Prostatic Obstructions* 266 pp. Baltimore Williams & Wilkins Co., 1931.
2. Riba, L. W. Present status of transurethral prostatic surgery collective review. *Internat. Abstr. Surg.* 68:74-92, 1939.
3. Mercier, L. Recherches sur une saillie particulière de la valvule vésico-urétrale formant une barrière au col de la vessie. *Compt. rend. Acad. d. sc.* 12:993, 1841.
4. Bottini, E. Radicale Behandlung der auf Hypertrophie der Prostata beruhenden Ischurie. *Arch. f. klin. Chir.* 21:1-24, 1877.
5. Young, H. H. A new procedure (punch operation) for small prostatic bars and contracture of the prostatic orifice. *J. A. M. A.* 60:253 257, 1913.
6. Caulk, J. R. Infiltration anesthesia of the internal vesical orifice for the removal of minor obstructions presentation of a cautery punch. *J. Urol.* 4:399 408, 1920.

7. Stern, M. Resection of obstructions at the vesical orifice new instruments and a new method. *J. A. M. A.* 87:1726 1730, 1926.
8. Davis, T. M. Prostate operation: prospects of patient with prostatic disease in prostatectomy vs resection. *J. A. M. A.* 97:1674 1679, 1931.
9. McCarthy, J. F. Suggestions as to procedure in use of McCarthy visualized prostatic electrotome. *J. Urol.* 27:265 271, 1932.
10. Thompson, G. J. New direct vision resectoscope. *Urol. & Cutan. Rev.* 39:545, 1935.
11. Young, H. H. The radical cure of cancer of the prostate. *Surg., Gynec. & Obst.* 64:472-484, 1937.
12. Johnson, C. M. and Burns, R. A. Surgical treatment of obstructions of vesical neck: evaluation of recent advances. *Urol. & Cutan. Rev.* 43:130 137, 1939.
13. Chetwood, C. H. Obstructing prostate. *Urol. & Cutan. Rev.* 37:44 49, 1933.
14. Bugbee, H. G. Further observations on the use of the high frequency spark for the relief of prostatic obstruction in selected cases. *M. Rec.* 85:273 296, 1914.
15. Young, H. H. cited by Riba.²
16. Orr, L. M., Jr and Honke, E. M. Study of results of prostatic resections after 5 years. *Urol. & Cutan. Rev.* 43:91-93, 1939.
17. Nesbit, R. M. Transurethral prostatic resection: an evaluation based upon the study of four hundred cases. *J. Urol. & Cutan. Rev.* 38:605-610, 1934.
18. Davis, E. Prostatectomy or transurethral prostatic resection? Plea for the selectionist. *J. A. M. A.* 112:681-687, 1939.

DISCUSSION

DR. JOHN P. BOWLER, Hanover, New Hampshire: The crux of the situation is expressed in the conclusion of Dr. Smith's paper, in which he quotes Dr. Brewster to the effect that the best operation is that from which the surgeon is likely to get the best results; in other words, the point to be emphasized is that if the subject were approached from the point of view of the operator rather than of the operation, it would be clearly grasped. There is no doubt that transurethral resection has increased the armamentarium of the surgeon. In the past five or six years I have performed from a hundred and fifty to two hundred such resections, but I am still uncertain as to the value of this procedure. That mere statement is a condemnation of the operation—as well, perhaps, as of me.

The one advantage of transurethral section is that it has increased the operability of early cases with a small residuum—cases that previously have not been considered acceptable for open operation, but those that are relatively simple and in which there is slight risk.

One of the difficulties from the standpoint of practice is that this procedure has been presented to the general public as a minor operation, which is unfortunate. It has not been so in my cases, and certainly the postoperative care is far more detailed and important than that of the open operation.

I see no advantage in the Nesbit procedure. It is neither one thing nor the other, and the combination of urethrotomy and transurethral section seems to me unsound.

The type of operation is a matter for the operator to decide. Transurethral resection is not a minor procedure. It offers distinct advantages in the increased operability of early cases, and is of special value in malignant cases in which there is nothing to offer the patient but the palliation of obstruction. Most of us have not had so much experience as has Dr. Smith in the total perineal operation, so that we are compelled to resort to resection and x-ray treatment.

DR. J. DELLINGER BARNEY, Boston: Dr. Smith's paper is a splendid summary of his extremely safe and sane attitude toward the advantages and disadvantages of resection as opposed to open operation, whether perineal or suprapubic.

As happens in so many surgical fields, enthusiasm and lack of judgment have now given way to a temperate consideration of every case encountered. When resection first appeared, it was performed by everyone as a minor

and easy procedure that offered cure for all types of cases. It has now come to be realized that this operation is not always possible, and that even when it is, the results are often unsatisfactory. As a consequence, there is now being practiced a more scrupulous selection of cases for resection.

I now perform resections in 60 to 75 per cent of prostatic obstructions. This is much higher than my former percentage, because as one acquires more skill in the operation one is able to manage successfully cases that five or ten years previously one would not have dared to attempt.

Since resection must often be done in two stages, it subjects the patient to a great deal of unnecessary risk. The patient is frequently old and feeble, he must submit to a second anesthesia and go through a second convalescence, not to mention the mental and psychic excitement involved. This being so, the surgeon, unless he feels assured of success, should have recourse instead to open operation.

As to recurrence after resection, I have had only 1 case, an early one. The patient was a young man in good health, the resection was entirely successful, with no bladder symptoms and a clear urine. This condition lasted for five or six years, when obstruction developed, he finally had 10 ounces of residual urine. I performed a suprapubic operation, and found a large prostate that had probably grown after the resection, largely perhaps because I had not resected much tissue in the first place. I removed the prostate and the patient made an excellent recovery, he has been well ever since.

This operation, therefore, fills a distinct lack in being applicable to the type of prostate that Dr Smith has shown to be impossible or difficult to enucleate by a perineal operation. It is especially suitable for the cancerous prostates that used to be treated by suprapubic cystotomy, or by a fairly extensive perineal operation, which carried a high mortality and involved a great deal of unnecessary risk. The operation is also admirably adapted to old and feeble patients with small prostates. One can sometimes remove only a little prostatic tissue, yet obtain a perfectly good clinical result, and the patient, who will not live very long in any case, is made comfortable.

As time goes on and surgeons gain wider experience with this operation, they will select cases even more carefully, and will make sure that the procedure selected is the best one for the case in hand and involves the least risk to the patient.

DR FLETCHER H COLBY, Boston. I differ with Dr Smith in that I regard transurethral resection as the operation of choice for benign enlargement of the prostate or hypertrophy of the prostate whenever possible.

Ever since seeing my first prostatectomy, I have hoped for some better method of relieving urinary retention. Transurethral resection is perhaps not the answer, but it seems to come closer to it than open operation does.

As Dr Smith has said, it is necessary completely to remove all hypertrophied tissue to perform a satisfactory operation and obtain a good functional result. This requires skill and experience, but it can be done by transurethral resection as well as by open operation. Post mortem specimens removed after transurethral resection have shown the prostate to be as cleanly and adequately removed as would have been possible with any other method.

No good operation should be condemned because it is technically difficult. Resection offers the patient a shorter period of hospitalization, less postoperative pain and discomfort and at least as low a mortality and as good a functional result as open operation does.

Both perineal prostatectomy and transurethral resection are excellent operations, the latter is one of the outstanding contributions to urology. There is no reason why these two operations should conflict, since prostates that are of such size that they can be removed completely by resection are best so treated, and the others are best removed by perineal prostatectomy. The choice between the operations is really one of necessity, and depends on the operator's ability adequately to remove the prostate. The average hypertrophied prostate weighs about 45 gm, and this amount of tissue can be removed by transurethral resection in a reasonable length of time.

I have been able to determine the size of the enlarged prostate and its suitability for resection more accurately by cystourethrograms than by cystoscopic and rectal examination. Furthermore, their use spares the patient the discomfort and danger of cystoscopic examination.

Incontinence or rectal injury should never result from a properly performed transurethral resection. So far as this hazard of operation is concerned, a recent comparison of transurethral resection and perineal prostatectomy by two outstanding surgeons, Nesbit and Davis, showed that the functional result of the two operations was equal except for some incontinence after perineal prostatectomy.

In New England more has been said against than in favor of transurethral resection. I should like to see this operation as favorably considered here as elsewhere, so that patients would not think it necessary to go to other parts of the country to secure its advantages.

DR RICHARD F O'NEIL, Boston. I have heard many papers on this controversial subject but never one to compare with Dr Smith's in sequence, clearness and conviction. My colleagues have said about all that is possible to say on the subject, but I should like to add that we have been a little reluctant to carry out resection as freely in Boston as is done in other parts of the country, this policy is, in my opinion, a sound one.

DR SMITH (closing). I asked Dr Colby to discuss this paper because I knew that he represented a different point of view from mine. I suspect that we are not so very far apart, except in our psychologic reactions to resections. He likes to do them and I do not. I get much more satisfaction from an open operation where I can control every step by sight and touch, whereas Dr Colby probably, through his superior skill in the use of the instrument, feels more at home when he is working at the end of the resectoscope. I believe that if one has sufficient experience with these cases, one can become extremely skillful in transurethral resection, as has been demonstrated in certain well known clinics.

One of those present has said that total removal of the prostate by the resectoscope is possible. This statement was made at a medical meeting in Chicago, whereupon a number of surgeons declared that they had performed prostatectomies on patients on whom the speaker had performed resections. These remarks seemed to me rather cruel but they did show that the resectionist cannot be sure that he has removed all the obstructing tissue.

DISORDERS OF NUTRITIVE DEFICIENCY AND THEIR TREATMENT*

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THE composite picture that portrays the diseases of a people changes from time to time, just as do the sketches in a fashion magazine. True, a quarter of a century alters the lines in the first hardly as much as a single season alters the second, but the changes come just as surely. Thirty years ago the picture familiar to me in the Southern States was intensified by the high lights of typhoid fever, malaria and hookworm. In the next picture those lights were greatly subdued, and there appeared several ugly splotches made by pellagra. Today, the image is wholly different. As the pellagra splotches are being removed there is to be seen an entirely new coloration, all pervading, but in lighter tones, produced by a new group, the less outspoken forms of the deficiency diseases. Since this picture may confront you in New England, I should like to discuss some of its features.

It has well been said that few greater tragedies come to man than the emotional depression, the dulling of intellect and the loss of efficiency that accompany nutritive failure. This applies not alone to the well-characterized deficiency diseases such as outspoken beriberi, pellagra, scurvy and rickets, but with even greater force to these less clearly defined borderline states. They are of vastly more frequent occurrence.

My own interest in these disorders was first aroused by two experiences. In the effort to apply a modified form of the old Weir Mitchell rest cure to a group of patients who offered a large array of vague complaints, none of which could be related to any known disease, I was often gratified to find that the treatment was highly successful, but with almost equal frequency I was puzzled over the explanation of this success. In addition to rest and to psychotherapy of a sort, these so-called "neurasthenics" were given an abundance of food, in which milk and eggs bulked large, and, even though anorexia was a frequent complaint, it was insisted that the patient eat all that was offered him. The results were sometimes graphic. Nervous stability was restored, pains disappeared, vague discomforts were no longer complained of, and the patient's outlook

on life was often greatly improved. It finally became evident that it was the food, not the rest or the attempted psychotherapy, that cured the patient.

The other experience came when Dr. J. B. McLester reported that a significant number of patients coming to the Hillman Hospital with pellagra had been admitted the previous year with a diagnosis of neurasthenia. On further investigation it became apparent that before the skin lesions or other evidences of frank pellagra appear, there is often a preclinical state in which nervous instability and diarrhea are prominent features, and that in such cases the old designation pellagra *sine* pellagra is appropriate. We have made a diligent search for patients of this group, and a number have been found.

The deficiencies from which these patients suffer are almost always multiple. Indeed, frank pellagra, although apparently a disease entity, often presents evidence of more than one type of deficiency. Roughness and redness of the lips with inflamed fissures at the corners of the mouth may tell of riboflavin deficiency, or neuritis with edema may point to lack of thiamin and perhaps of protein. So difficult is it to determine precisely the nature of the deficiency from which the patient suffers that, with more seriousness than humor, there is occasionally recorded the diagnosis of "pellagra with a dash of beriberi." This is true not only of the outspoken disease, but also of preclinical pellagra.

The symptoms of preclinical pellagra include nervous instability, personality changes, mental depression, easy exhaustion, anorexia, vague digestive disorders and a tendency toward diarrhea. Often the tongue is red, or there may be merely a history of glossitis. On the other hand, there may be no symptoms other than anorexia and nervous instability. Any of these symptoms may be absent; instead of looseness of the bowels, for example, there may even be constipation. Untreated, the patient may the following spring develop outspoken pellagra, or without clearly defined symptoms he may for years remain merely in vague ill health. In either case adequate treatment will completely restore health.

Subclinical pellagra is not the only borderline form of nutritive failure encountered. There are

*Presented in part at the New England Postgraduate Assembly, Cambridge, Massachusetts, November 1, 1939.

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many others, and in these sometimes one and sometimes another group of symptoms are seen. Digestive discomforts, with abdominal distention and anorexia, often predominate. Sometimes these are the only symptoms. The patients offering such complaints were formerly called neurasthenics, but it now appears that their disabilities are often genuine, being largely due to loss of muscle tone, which, like the neuritis of similar origin, is dependent on lack of vitamin B₁. Diarrhea sometimes dominates the clinical picture. Many years ago, we first began to see at the Hillman Hospital patients with achlorhydria whose only other evidence of disease was diarrhea. No doubt many of these had pernicious anemia, but not all. Some had early pellagra. The diarrhea of others was apparently nonspecific but was dependent nonetheless on nutritive deficiency. Patients of this last group usually recovered promptly when given an abundant diet, including liberal quantities of milk and eggs. Such patients continue to appear, and although even today their disorder cannot always be identified with any of the well-defined deficiency diseases, if they are given liver extract the diarrhea as a rule disappears.

Of a different type, perhaps, is the occasional patient with achlorhydria and an anemia of non-descript character who tells of one or two copious bowel movements each morning with nausea and, perhaps, profound exhaustion. During the rest of the day he feels well. Sometimes the tongue is red. In the sigmoidoscope the mucous membrane appears smooth and glistening, and in the fluoroscope the large bowel has a smooth, stringy appearance with loss of haustra. This is apparently a mild form of sprue, for large doses of liver extract given intramuscularly are always of benefit.

One of the commonest as well as the most distressing symptoms encountered in the borderline states is mental depression. Many deficiency disorders are accompanied by this symptom, but I have been particularly impressed by two groups of patients in whom mental depression predominates. In the one, nutritive failure is merely a contributing factor, in the other, it is apparently the underlying cause of the depression. As an example of the first group, I have seen a patient with typical manic depressive insanity of many years' duration greatly improved when the faulty dietary habits of a lifetime were corrected and nicotinic acid and thiamin given. Similar improvement has been seen in cases of so-called "involutional melancholia." Patients of the other group may present additional signs of nutritive failure, but as a rule nervous instability and emotional depression are the only evidences of ill health. I have seen pa-

tients of this type for whose depression no ready explanation could be found promptly regain their equilibrium and sense of well being when they were given intramuscular injections of liver extract. Other patients present a symptom complex identical with what is sometimes labeled toxic psychosis. They are confused, disturbed in speech and disorientated, and their gait is often unsteady. They are as a rule users of alcohol, though not necessarily to excess. When they are given thiamin and nicotinic acid, the psychosis, thick speech, and unsteady gait disappear.

Even the disabilities of old age are sometimes due in part to lack of nutritive essentials. An example of this was seen in the case of a charming elderly lady whose complaints of weakness, unsteadiness in gait and unwonted mental depression were at first regarded as the inevitable accompaniment of years. When it was discovered, however, that her tongue had the appearance of raw beef, although no fault could be found in her diet except its frugality, she was given large quantities of yeast, supplemented by thiamin and riboflavin. Immediately the tongue assumed a normal appearance and the patient's former sense of well being returned. This is not an uncommon experience. In such cases it seems fair to assume that the changes of advanced age have in some way interfered with the absorption and utilization of essential substances. I do not mean to suggest that adequacy in nutrition will prevent old age, far from it. I do make bold, however, to say that if the results of animal experiment can be applied to man, it can be assumed that long continued nutritive deficiency will hasten the onset of old age, and conversely that an optimal diet observed throughout the greater part of a person's life will postpone senility. What is of even greater interest, such a diet can be expected to prolong the person's period of usefulness.

Vitamin deficiency is not the only cause of nutritive failure. Deficiency disorders are produced just as effectively, though not always in so graphic a manner, by lack of proteins and of minerals. Witness the endemic edema that is due in part to protein deficiency, as is the edema sometimes seen in pellagra. Of similar nature is the puffiness of the ankles exhibited by patients convalescing from a long illness. Even the so-called "toxemia of pregnancy" described by Strauss is apparently due to lack of protein. Here again, if the results of experiments on animals can be applied to man, it may be assumed that lack of protein in the diet will lead to easy exhaustion, loss of stamina and other disabilities, this accords with clinical experience.

Lack of iron is also a potent cause of trouble. I

have been impressed by the frequency of iron-deficiency anemias. It has repeatedly been observed that this type of anemia occurs oftenest in women in the late teens or about the time of the menopause. These are frequently apparently healthy girls and young women who complain only of easy exhaustion, and not always of that. This disease seems to me to be identical with the chlorosis described here and in England forty years ago, but I am under the impression that we see it in the South today more frequently than it is seen in New England. The combined demands of growth and menstruation, and in addition oftentimes a freaky appetite, with a deficient diet are probable causative factors. Another form of iron-deficiency anemia is that described as the idiopathic anemia of middle-aged women with achlorhydria. Many of these patients are chronic invalids who live on a diet deficient in iron. Menorrhagia and bleeding hemorrhoids may also be causative factors. There is reason for believing that in the first group, and possibly in the second group also, difficulties of absorption play an important role.

For the prevention of nutritive failure, a reasonably liberal, well-balanced diet is as a rule sufficient; it is well to emphasize, too, that for this purpose vitamins and minerals should be obtained, not from the druggist, but from the grocer and the dairyman. This is not true, however, in every case, for there are many conditions in which nutritive needs are greatly increased, and the food, therefore, should be fortified with more concentrated substances. These conditions may be physiologic, as in increased exercise and in pregnancy and lactation. At other times the increased demand may be due to illness, as in infectious diseases, hyperthyroidism and many forms of chronic illness. In addition, the possibility of inadequate absorption must be considered. The absence of bile from the intestinal tract, achlorhydria, frequent diarrhea or a history of alcoholism should provide a warning that nutritive substances taken by mouth may not be adequately absorbed. In such cases greatly increased amounts of these substances should be given, or they should be administered parenterally.

The distorted anatomic relations and consequent disturbances of function that occasionally follow a short-circuiting or other operation on the bowel may lead to nutritional failure no matter how abundant the diet. Such a fault can rarely be corrected, but I recently saw this accomplished in a very gratifying manner by means of a second operation. In the effort to prevent deficiency disease, therefore, particularly after a febrile illness or in the presence of gastrointestinal derangement, the

diet should be considered from two viewpoints, first in the light of the person's nutritive needs, and secondly in regard to his ability adequately to absorb and utilize all essential substances.

Once, however, the deficiency becomes manifest, the picture changes and the need grows vastly more urgent. Treatment under these circumstances should be governed by three principles, which are as follows.

First, the patient can no longer depend solely on the grocer and the dairyman. Recourse must be had also to the pharmacist, and the missing substances be secured in concentrated form.

Secondly, because the deficiencies under discussion are seldom single, more than one vitamin or other essential substance must as a rule be given. Pellagra, for example, cannot always be cured with nicotinic acid alone; thiamin and riboflavin also are often needed, as well as proteins of good quality. A like condition obtains in many other states of nutritive failure, and for this reason two substances have come into use that are especially suitable, yeast and liver extract. The value of the latter when given intramuscularly has been demonstrated in a number of nutritive disorders, both outspoken and borderline. This, no doubt, is because the liver as the "commissariat" of the body elaborates and stores a number of essential substances. Extracts made from this organ can provide not only the antianemic principle but also other necessary material, and such preparations should not, therefore, be too highly concentrated. Even in such a clear-cut deficiency disease as pernicious anemia the patient often gets a greater "lift" and his sense of well-being reaches a higher plane if he is given the liver extract that carries the broader fractions.

Thirdly, the needed substances must be given in relatively enormous amounts. Before the nicotinic-acid era, for example, it was known at the Hillman Hospital that the daily dose of brewer's yeast that could with maximum benefit be given pellagrins was 180 to 270 gm. (a half pound!). Although 1 mg. of thiamin is regarded as the maintenance dose, it has been found in deficiency states that 20 to 50 mg. daily must be given before clinical improvement is seen, and cases of nerve injury have been reported in which 100 mg. of this vitamin daily were required. The same is true of vitamin C. Whereas 40 to 60 mg. has been estimated as the optimal intake, deficiency states have been reported in which ten to twenty-five times this amount was necessary. Likewise, in the use of liver extract I have found that vastly better results can be obtained if very large amounts

are used; massive doses sometimes bring excellent results when small doses have accomplished nothing. It is difficult to understand the magnitude of this need unless it be that it is due in part to the

necessity for replenishing exhausted stores. The physician who would treat deficiency diseases cannot afford to be timid.
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MEDICAL PROGRESS

CLINICAL BLOOD CHEMISTRY IN GENERAL PRACTICE*

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THE extensive use of blood chemistry in clinical medicine was established largely through the efforts of the late Professor Otto Folin,¹ within the memory of the present generation of active practitioners. The value of such procedures to confirm bedside impressions and to follow quantitatively the progress of disease is now unquestioned. Two general abuses, however, have arisen: the abandonment of sound clinical observation and clear thinking in favor of laboratory reports, and the misinterpretation of such data through ignorance of their limitations and of the several factors that together yield a given physiologic concentration. These abuses will disappear only when physicians become better acquainted with the intricacies of human physiology.

To call attention to the possible pitfalls that confront the interpreter of chemical data, this synopsis of common laboratory tests has been formulated. It should be read with the mental reservation that, owing to various physiologic complexities and analytical complications, the statements made below are not over 80 per cent correct.

The constituents of the blood that are commonly used in clinical medicine may be classified arbitrarily as follows: plasma proteins; nonprotein nitrogenous compounds; sugar; lipoids; pigments; calcium and phosphate; bases (cations); acids (anions); and regulators (vitamins, enzymes and hormones). In the summary that follows, only the commonest examples of each of these are cited.

Whole blood versus serum or plasma. Because blood is a two-phase system of cells and plasma, determinations of concentrations in whole blood record necessarily the average of two values, that is, the concentration in the cells and the concentration in the plasma. In general, plasma or serum values are preferable, because they reflect

more directly the true *milieu interne*. Moreover, differential permeability complicates the problem. Thus human red blood cells probably contain no calcium; if a calcium estimation were performed on whole blood, therefore, the answer would record the net effect of a 45 per cent fraction (cells) containing no calcium, plus a 55 per cent fraction (plasma) containing 10 mg. per 100 cc. of calcium. Thus the whole blood calcium would be 5.5 mg., but it would vary with the hematocrit reading.

The differences are even more confusing when chloride or carbon dioxide is investigated, because these substances may shift from plasma to cells, depending on circumstances. Moreover, the variation in the normal range may lead to serious misunderstandings. For example, a recent diagnosis of Addison's disease was falsely made because a *whole-blood* value for chloride of 80 milliequiv. per liter (normal) was reported to a clinician who was accustomed to think in terms of the normal *plasma* value of 108 milliequiv. Similarly, a *plasma* carbon dioxide combining capacity of 70 vol. per cent was misinterpreted as evidence of alkalosis by a clinician who was accustomed to think in terms of the normal *whole-blood* value of 48 vol.

With rare exceptions, it is advisable to avoid the use of whole blood, by employing plasma for all determinations except inorganic electrolytes, for which serum may be used. At the present time, however, whole blood is used for many purposes, so that this synopsis will describe values for it in those cases in which it is commonly employed.

PLASMA PROTEINS

Plasma proteins are ordinarily determined by some modification of the Kjeldahl procedure. After oxidation and digestion the ammonia nitrogen may be determined either by alkalimetric titration or colorimetrically after nesslerization. Reliable methods are given by Folin.¹ In my² progress report for last year, modern revisions of protein frac-

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tiation were discussed. The fractions described here, however, represent the old-fashioned partitions still in common use.

Normal values usually range from 6.5 to 7.5 gm. per 100 cc. Rarely, values of 6.3 to 8.0 gm. are found under physiologic circumstances. The protein may be subdivided as follows: albumin, the value for which is usually between 3.8 and 4.4 gm.; and globulin, the value for which is usually 2.2 to 3.4 gm. The value for fibrinogen is usually under 0.6 gm. and is ordinarily included in the globulin fraction. The albumin-globulin (A:G) ratio, therefore, is usually between 1.4 and 2.2.

Low values for total protein are encountered in parenchymatous Bright's disease (the so-called "nephrotic" syndrome), in malnutrition and in infections. In *edema* the critical average values that herald the onset are for total protein 5.0 to 5.5 gm. per 100 cc., and for albumin 2.5 gm.

High values are commonly found in the marked dehydration that accompanies vomiting and diarrhea. Thus in cholera the total protein may reach over 11 gm. per 100 cc. Values over 12 gm. are not uncommon in multiple myeloma. In lymphogranuloma inguinale some elevation of protein is also common. The globulin fraction tends to be high in hepatic inflammation but usually falls after extensive liver damage. Among the infections, kala-azar commonly produces high globulin values.

NONPROTEIN NITROGENOUS COMPOUNDS

Blood Urea Nitrogen

The value for blood urea nitrogen may be determined gasometrically by measurement of the nitrogen evolved after treatment with hypobromite. It is also very conveniently estimated by the determination of ammonia after treatment with the enzyme, urease. Reliable methods are given by Peters and Van Slyke.³

Normal values are usually between 9 and 14 mg. per 100 cc. Rarely, values of between 5 and 23 mg. are found under physiologic circumstances. This variability is usually due to changes in normal nitrogen metabolism. For example, Priestley and Hindmarsh¹ found that when the urinary nitrogen reached 11.2 gm. per twenty-four hours the blood urea nitrogen was 11.3 mg. per 100 cc.

Low values are frequently found after diuresis because urea is swept out with body water. The values tend to be low in pregnancy and in acute yellow atrophy of the liver. Because a high-carbohydrate diet spares protein metabolism, the

normal range may drop 40 per cent when carbohydrate is forced.

High values are found in dehydration, in primary renal insufficiency and in renal insufficiency due to congestive heart failure.

Special tests. Two clinical function tests involve the determination of blood urea nitrogen. The urea-clearance test of Van Slyke⁵ relates the urinary urea to the blood urea by determining the volume of blood theoretically cleared of urea in one minute. The Mosenthal index⁶ is the ratio of blood-urea nitrogen to total nonprotein nitrogen multiplied by 100. The upper limit of normal is 44. Values above 80 suggest strongly Bright's disease and impending uremia. A normal ratio with high total nonprotein nitrogen suggests that primary renal insufficiency is not present.

Blood Nonprotein Nitrogen (Total)

After precipitation of blood proteins, the total nitrogen in the filtrate is estimated after Kjeldahl's digestion. The ammonia so formed is commonly determined colorimetrically after nesslerization. Reliable methods are given by Folin.¹

Normal values usually range between 25 and 35 mg. per 100 cc., rarely between 25 and 40 mg. Occasionally, a normal person on a high-protein diet may show 45 mg. The total nonprotein nitrogen represents the sum of nitrogen moieties contributed by urea, aminoacids, uric acid, creatine, creatinine and the undetermined nitrogenous material in the blood filtrate. The nonprotein nitrogen concentration is higher in the corpuscles. In the plasma, it is ordinarily only 18 to 30 mg. per 100 cc., that is, approximately twice the blood urea nitrogen. The discrepancy between corpuscles and plasma is due largely to nitrogenous material of unknown composition; consequently, plasma determinations are much to be preferred. In general, considerable variations of nonprotein nitrogen are caused by alterations in urea nitrogen, in the undetermined nitrogen fraction, or in both. Blood nonprotein nitrogen reflects the balance between protein catabolism and urinary elimination. Consequently, there are considerable diurnal variations that bespeak the necessity of determining fasting values. Retention of water or diuresis will also change the nonprotein nitrogen.

Low values are found in starvation, in cachexia and to a certain extent in pregnancy. Unlike blood urea nitrogen, the total nonprotein nitrogen is ordinarily not affected in moderate hepatic disturbance.

High values are found in the characteristic azote-

nia of nephritis, in which values ranging from 100 to over 200 mg. per 100 cc. are common in the terminal stages or during acute exacerbations. Poisoning from mercury and uranium, as well as that from certain drugs, has much the same effect. One may find a high nonprotein nitrogen in dehydration such as that associated with heat cramps, after severe burns, including x-ray necrosis, in the crises of hyperthyroidism, in hyperparathyroidism of marked degree, in advanced hepatic cirrhosis and in gastrointestinal obstruction associated with repeated vomiting or after prolonged severe diarrhea, as in cholera. Even such common disturbances as chronic passive congestion, surgical shock, severe fevers, acute infections, diabetic coma and, possibly, uncomplicated gout lead to some elevation. Lack of salt, particularly in the crises of Addison's disease, is associated with azotemia. Azotemia also accompanies the hepatorenal death found in Weil's disease.

Blood Uric Acid

The value for blood uric acid is ordinarily determined colorimetrically. A convenient method is that of Folin.⁷ Uncertainty still exists as to how uric acid is distributed between cells and plasma, and for this reason it is probably much better to use serum.⁸

Normal values are, for blood, 2.0 to 4.5 mg. per 100 cc., and for serum 3.0 to 5.0 mg. These values vary considerably in different laboratories, according to the technic used. In general, any single value of 6 mg. or above should be repeated, even though there is no clinical indication of gout. *Normal* values are affected somewhat by meals, especially those high in fats and nucleins.

Low values are not striking, but tend to occur after such medication as thyroid, cinchophen or colchicine and after diuresis induced by calcium chloride.

High values may be produced by fasting, especially in children, in whom a four-day fast may cause an elevation up to 10 or even 12 mg. per 100 cc. On the other hand, this condition may be relieved by the feeding of carbohydrate, protein or aminoacids. The feeding of thymus (true sweetbread) may cause a moderate rise. In gout (podagra), elevations in serum uric acid concentration from 5 to 11 mg. per 100 cc. occur in the majority of cases if repeated determinations are made at appropriate critical times.⁸ Moderate elevations are common in leukemia, in advanced chronic nephritis and in polycythemia. Pneumonia may cause a temporary rise, and even severe exercise may increase the value about 1 mg. per 100 cc.

Blood Creatinine

The value for blood creatinine is commonly determined by the colorimetric method of Jaffe, which involves the use of alkaline picrate. A reliable modified method is that of Danielson.⁹ There is an academic dispute whether *in vivo* creatinine exists as such or in the form of a chemical precursor. This material is distributed equally between cells and plasma. Its concentration is more constant than that of any other nitrogenous component of the blood. It is essentially unaffected by age, diet, exercise or pregnancy.

Normal values range from 1.0 to 1.8 mg. per 100 cc.

High values, up to 5.0 mg. per 100 cc., are common in chronic nephritis. Indeed, most clinical values over 2.5 mg. are due to nephritis. Above 10 mg. the prognosis is ordinarily very poor, and a value approaching 18 mg. implies imminent death. In urologic conditions producing obstruction low in the urinary tract, the creatinine tends to be but slightly elevated, even when the blood urea nitrogen is high. This point is of diagnostic interest in prostatism, urethral stricture and cancer of the bladder.

SUGAR

Blood Glucose

The value for blood glucose is ordinarily determined colorimetrically by one of the two Folin methods involving either an alkaline copper reduction¹ or the ferricyanide reagent.¹⁰ Of course, many other reliable reagents and methods have been described, such as the Somogyi¹¹ or Shaffer-Hartmann¹² titration methods. The corpuscles contain much reducing substance that is not glucose. For this reason the use of unclotted blood was introduced by Folin.¹³ Probably fresh plasma or serum is preferable from a chemical standpoint. In general, blood glucose tends to be destroyed rapidly unless careful measures are taken to preserve it.

Normal values of about 70 to 100 mg. per 100 cc., fasting, are obtained by the methods mentioned. Over 130 mg. is probably abnormal. For whole blood, between 20 and 30 mg. of the reducing substance is probably not glucose. In the cells as much as 41 to 51 mg. of false reducing value is found, whereas only 7 to 13 mg. is present in plasma.

Low values occur in starvation, in pituitary hypofunction, in exhaustion, for example, during a marathon race, and in Addison's disease. In severe liver necrosis due to phosphorus or chloroform poi-

soning and in acute yellow atrophy of the liver, severe hypoglycemia may cause fatal convulsions. In tumor of the pancreas, or hyperfunction such as may follow the assimilation of glucose, marked reduction of blood sugar may occur.

High values are found in excitement, fear, cold and asphyxia (especially in carbon monoxide poisoning) and after brain injury. These conditions represent reactions of the sympathetic nervous system, as described by Bernard and also by Cannon.¹⁴ Hyperglycemia after meals is common in hyperthyroidism and may simulate closely true diabetes mellitus. Even in normal people, it is said that so-called "alimentary hyperglycemia" may lead to glycosuria. A variety of nondescript disturbances may cause intermittent glycosuria. In the dehydration of children and in eclampsia these may be accompanied by temporary hyperglycemia, but in uncomplicated renal injury the blood sugar is usually normal. The differentiation of various clinical types of glycosuria is well discussed by Joslin and his associates¹⁵ in the well-known monograph on diabetes mellitus.

Glucose-tolerance curves. This procedure has assumed increasing importance since the recognition of the role of the pituitary gland in diabetes, as described by Houssay.¹⁶ The simultaneous administration of insulin is now used as a special form of differential functional test, as discussed by Himsworth.¹⁷ It should be remembered that venous blood tends to be lower than arterial blood in the normal postabsorptive patient, whereas the reverse may be true in diabetes.

LIPIDS

Blood Cholesterol

The value for blood cholesterol is usually determined colorimetrically by the acetic anhydride reagent,¹⁸ but it is widely recognized that this method includes other substances. The extent of the error depends on the details of the manipulation involved, so that the normal range varies a great deal with local conditions. For research purposes, precipitation by digitonin¹⁹ is sometimes preferred, despite the high cost of the reagent. The total cholesterol may be divided into two portions, that is, the free and the esterified. Cells and plasma contain the same concentration of total cholesterol, but in the fasting state the red cells contain practically no cholesterol ester. In the normal plasma, free and esterified cholesterol are present in constant and nearly equal proportions.

Normal values in many laboratories range from 140 to 170 mg. per 100 cc., rarely from 100 to 230 mg., for total cholesterol.

Low values are found in prolonged starvation,

in cachexia, in scurvy, in severe infections and in certain anemias. In infancy, values as low as 50 mg. per 100 cc. are not uncommon. In hyperthyroidism, cholesterol tends to fall as the basal metabolism rises, but there is no reliable standard by which to evaluate a single determination in the individual patient.

High values, such as 300 mg. per 100 cc. or over, are found in pregnancy, myxedema and the so-called "nephrotic syndrome." Cholesterol may be increased in diabetes, but this is not invariable. After a meal there is usually a slight rise in total cholesterol, and after the ingestion of meat this rise may be prolonged. In liver disease, especially when icterus is present, cholesterol is elevated. The ratio of esters to free cholesterol is characteristically low in parenchymatous disease of the liver.

PIGMENTS

Plasma Bilirubin

The value for this pigment is usually determined by van den Bergh's colorimetric reagent. A convenient modification is that of Rhamy and Adams.²⁰

Normal values range from 0.25 to 0.6 mg. per 100 cc., corresponding to an icteric index of less than 8. One van den Bergh unit equals 0.5 mg. per cent bilirubin. It should be noticed that the quantitative van den Bergh procedure does not reflect the qualitative type of jaundice.

High values are now rarely found in pernicious anemia, although a moderate elevation was formerly common, that is, 1 to 2 mg. per 100 cc. or an icteric index of 20 to 25. Somewhat higher values often occur in hepatic cirrhosis. In hemolytic anemia the increase in bilirubin varies with the disease. In obstructive jaundice or in acute yellow atrophy extremely high values are found, for example, over 40 mg. per 100 cc., corresponding to an icteric index well over 100. As a rough approximation, skin pigmentation occurs at 4 van den Bergh units, equaling 2 mg. per 100 cc. or an icteric index of 20.

The qualitative van den Bergh test is now thought by many investigators to be of dubious value in most cases. It rests on the principle that normal blood plasma contains colloidal bilirubin, whereas normal bile contains the pigment after detachment from its colloid carrier. The qualitative test should not be confused with the quantitative procedure used to determine total bilirubin. Characteristic findings in different types of jaundice are summarized in Table 1. It should be mentioned that obstruction due to stone in the common bile duct is rarely complete when subjected to such quantitative evaluation. On the other hand, cancerous obstruction is frequently complete.

CALCIUM AND PHOSPHORUS

Serum Calcium

The value for serum calcium is usually determined by titration (with permanganate or with acid) after precipitation as calcium oxalate. Obviously, oxalated plasma cannot be used for this determination. A reliable method is that of Fiske and Logan.¹¹

Normal values range from 9 to 11 mg per 100 cc, that is, a concentration of 5 milliequiv per liter (25 millimolar). Ordinarily, 3 to 5 mg per 100 cc of this amount is bound to protein. Other things being equal, calcium falls as inorganic phosphate rises, and conversely, calcium rises with in-

vitaminosis D may in extreme cases push the level up to 40 mg for short periods, apparently without marked deleterious effect. The synopsis in Table 2 is intended simply to give a rough idea of the combined blood findings in tetany. Exceptions to the findings recorded in the table are given by Peters and Van Slyke.⁸

In parathyroid disease the usual or characteristic combination of findings is as follows. In hypoparathyroidism calcium is low, phosphate is increased, calcium excretion and phosphate excretion are both diminished, serum phosphatase (see below) is normal, and tetany is present. In hyperparathyroidism, on the other hand, calcium is elevated, phosphate is diminished, both calcium and

TABLE 1 *Pigment Metabolism in Jaundice*

DIAGNOSIS	PLASMA				URINE†				STOOLS†	
	COLLOIDAL BILIRUBIN	BILE PIGMENT	UROBILINOGEN	COLLOIDAL BILIRUBIN	BILE PIGMENT	UROBILINOGEN	UROBILIN	COMBINED UROBILIN AND UROBILINOGEN	UROBILIN	COMBINED UROBILIN AND UROBILINOGEN
Normal subject	+		0-trace	0	0	+		mg 0-4	+++	mg 40-280
Hemolytic jaundice	++++	0	Trace	0	0	Often sl +		1-10	++++	300-1800
Crisis or complication	++++	+	Trace		+	++++	+++	10-300		
Hepatogenous jaundice	++	+++			+++	++*	++ to ++++	4-200	++*	10-300
Complete obstruction of common bile duct	+	++++			++++	0	0	0	0	0-5

*Except in acholic stool per day

†Data represent 24 hour periods

crease of plasma protein. These two trends should be considered in evaluating the virtual normal in any given case. Mathematically, they may be expressed more precisely by the following equations:

$$\begin{aligned} \text{At pH 7.4, calcium (mg per 100 cc)} &= 0.556 \text{ protein (gm per 100 cc)} + 6 \text{ or, for adults, calcium} \\ \text{(mg per 100 cc)} &= 0.556 \text{ protein (gm per 100 cc)} \\ &- 0.255 \text{ phosphorus (mg per 100 cc)} + 7 \end{aligned}$$

This last equation refers to inorganic phosphate, expressed in terms of its inherent phosphorus.²²

Low values, for example, 4 mg per 100 cc, are found in severe hypoparathyroidism. In nephritis the calcium drops as phosphate retention ensues or when malnutrition produces low plasma protein. In Gee's steatorrhea (adult celiac disease) excessive loss of calcium soaps by the bowel may reduce the serum calcium to well below 7 mg. Two types of osteomalacia are recognized. In the first, calcium is little reduced but phosphate is subnormal, in the second, calcium is low and phosphate is normal to slightly increased. The latter type occurs much more commonly. Ordinarily, clinical tetany is likely to occur with values below 7 mg per 100 cc and is imminent below 5 mg.

High values may occur secondary to increased plasma protein, as in multiple myeloma. In hyperparathyroidism, increases are found up to a critical level of 20 mg per 100 cc. Artificial hyper-

phosphate excretion tend to be increased, serum phosphatase is often increased, and there is neuromuscular hypotonia.

Normal values for serum calcium are the rule in Paget's disease (osteitis deformans) and in hy-

TABLE 2 *Blood Findings in Tetany*

TYPE OF TETANY	SERUM CALCIUM	BLOOD BICARBONATE	PLASMA pH	SERUM PHOSPHATE AS P
Parathyroid	Low	Normal	Normal?	Increased
Gastric	Normal	Increased	Alkaline	Normal
Hyperparathyroid	Normal	Low	Alkaline	Normal
Alkaline	Normal	Increased	Alkaline	Normal
Infantile	Low	Normal	Normal	Increased?

perthyroidism. This is true in spite of the abnormally high calcium elimination during the active phases of each of these disturbances.

Serum Phosphate

The value for the phosphate ion (H_2PO_4^-) is ordinarily determined colorimetrically with a phosphomolybdate reagent; the result is expressed in terms of the inherent phosphorus. A convenient method is that of Fiske and Subbarow.²³ The cell content is in dispute.

Normal values for adults' serum range from 2 to 5 mg per 100 cc, for infants' serum, from 4 to 7 mg. Although inorganic phosphate is the type of phosphorus compound ordinarily referred to in the clinical literature, occasional reference will also be

found to acid-soluble phosphorus, for which normal ranges are as follows: in adults the cells contain 44 to 82 mg. per 100 cc. but the serum only 2.5 to 5.5 mg.; in infants the cells contain 43 to 70 mg., and the serum 4 to 8 mg. This acid-soluble phosphorus fraction exists in addition to the inorganic phosphate commonly referred to. In all cases the values refer to inherent phosphorus.

Low values for inorganic phosphate are found in the common variety of rickets and probably in the late rise characteristic of advanced, terminal hyperparathyroidism. Of the two known types of osteomalacia, that with low serum phosphate is found occasionally. Forced breathing may reduce inorganic phosphate to 1 mg. per 100 cc. of phosphorus. Likewise, insulin and adrenaline cause a fall.

High values are found in hypoparathyroidism, in acidosis induced by carbon dioxide and after the administration of pituitrin. In chronic nephritis inorganic phosphate retention has important prognostic significance. At 8 mg. per 100 cc. the condition becomes critical, and at 20 mg. death is to be expected.

Because phosphate is intimately connected with the chemistry of carbohydrates, fluctuations in carbohydrate metabolism frequently alter the concentration of serum phosphate. It is interesting that despite the marked clinical correlation of high plasma phosphate with low serum calcium, the onset of tetany is not directly related to the phosphate except through pH and calcium. Indeed, there is scientific evidence that the local concentration of carbon dioxide in the tissues, not the calcium or the reaction, is the final precipitating factor in tetany.²⁴

BASES

Serum Total Base

The serum total base represents the sum of the extracellular blood bases: sodium, potassium, magnesium and calcium.²⁵ It is often determined electrolytically, by the method of Consolazio and Talbott,²⁶ or, more simply, by titrimetric determination of the total inorganic sulfate equivalent to it, by the method of Stadie and Ross.²⁷ Obviously, one cannot use sodium oxalate as an anticoagulant for plasma. A convenient method for determining the value of sodium is that of Butler and Tuthill²⁸; for determining the value of potassium, that of Fiske and Litarczek.²⁹ Because different cations have different equivalent weights, it is preferable to speak of their concentrations in terms of milliequivalents per liter of serum or, more scientifically speaking, per liter of serum water. With this re-

duced terminology, the various cations listed below can be added together and considered in toto.

For the uninitiated, the following analogy may clarify the reason for the use of milliequivalents in summing the concentrations of various electrolytes: on a farm it is possible to specify the total number of animals, even though rats, sheep, cows and horses have quite different individual weights.

Several important physiological principles should be remembered in considering the concentration of the various serum bases. The concentration of the total base and of the constituent cations tends to be maintained even under considerable stress, so that the osmotic pressure of body fluids remains nearly constant. Moreover, the liquid outside of cells is in equilibrium across the cell membrane with the cell sap, which has the same concentration of total osmotically active ions as the serum with which it is equilibrated. This is true, of course, only when the concentrations are expressed in terms of equivalents of ions per kilogram of water, because 100 cc. of cells contains only 75 to 85 gm. of water, whereas serum contains 92 gm. of water and transudates 99 gm. Thus, per kilogram of total cell substance (75 per cent water), there are only 112 milliequiv. of total base, as compared with 148 milliequiv. per kilogram of serum. In addition, there is the slight complication that protein itself can bind base.

In general, the organism retains water and base simultaneously to form a sort of Ringer's solution. If extracellular fluid is gained, sodium is retained, but if the new fluid is intracellular, potassium is retained. Individual anions, for example, chloride, are subject to great change, although the summed anions must approximately balance the total base. On the other hand, total base and total anions do not vary greatly, and even individual bases change relatively little. Alterations in metab-

TABLE 3. Serum-Water Concentrations of Common Cations.

CATION	SERUM milliequiv. per liter	CELLS milliequiv. per liter
(Na ⁺)	154	0?
(K ⁺)	5	170
(Ca ⁺⁺)	5	0?
(Mg ⁺⁺)	3~	4
Totals	167	174

olism of total base, therefore, are compensated for by expansion or shrinking of the tissue spaces, which serve as a volume buffer, as described by Gamble.³⁰

Normal values range usually from 160 to 168 milliequiv. per liter of serum water, and ordinari-

ly sodium accounts for over 90 per cent of the total base. In Table 3 the concentrations of the common cations are given in milliequivalents.

Because the total number of positive charges in solution must approximately equal the total number of negative charges, it is evident that the total base must approximately equal the total anions.

method is that of Van Slyke and Sendroy.³¹ Red cells show only half the concentration of plasma, partly because of Donnan's equilibrium.³² Chloride is the most abundant electrolyte and crystalloid constituent of the blood. In sweating, diuresis or a low salt diet, chloride tends to run parallel with sodium. Because the total base, as noted

TABLE 4 Component Cations (Total Base) and Anions (Total Acid) in Normal Serum

Total base = total acid												
Sum of positively charged ions (cations)						= sum of negatively charged ions (anions)						
	Na ⁺	K ⁺	2 Ca ⁺⁺	2 Mg ⁺⁺		Cl ⁻	+ HCO ₃ ⁻	+ f × protein ⁻	+ H ₂ PO ₄ ⁻	+ R ⁺		
Expressed as m l equiv per liter	142	5	5	2		105	+ 25	+ 17	+ 2	+ 5		= 154
Expressed as mg per 100 cc	327	+ 19	+ 10	+ 24		34		f × 100	+ 3.1			
Expressed as vol per cent							48					

*The factor *f* by which the protein concentration is multiplied expresses the net capacity of the combined plasma proteins to bind base at pH = 7.4

†Sulfate + organic acid radicals

Note that the value for the total base is only about 154 milliequiv per liter for serum as compared with 167 milliequiv for serum water (Table 3). This is true because only 92 per cent of serum is water. The values for serum water and cell water that is 167 and 174 milliequiv respectively also differ slightly.

This will be clear from the equations listed in Table 4, which give the typical normal values for the individual components.

Low values for serum water, that is, a fall of 10 per cent or 15 to 20 milliequiv per liter, may occur in severe burns, in marked pyloric stenosis or in terminal nephritis. Representative values in nephritis with edema might be 142 to 156 milliequiv, as compared with 150 to 160 milliequiv without edema. Because the kidney fails to conserve base in chronic glomerulonephritis, late values may be 139 to 149 milliequiv. Similarly, in severe sweating causing heat cramps, the total base may fall to 140 milliequiv, of which sodium supplies 130. In the edema of malnutrition, as in diabetes, the total base may occasionally fall to 130 milliequiv. Of course, the foregoing values all represent concentrations per liter of serum water. Low values are also found in Addison's disease, in Simmonds's cachexia, in major gastrointestinal upsets and in acute poisoning with bichloride of mercury. Even the severe sweating of acute fevers, for example, pneumonia, may induce a definite fall. Of specific interest is the low potassium in familial periodic paralysis.

High values are found in x-ray nephritis, when potassium may increase severalfold. It increases in Addison's disease, for which reason the total base often fails to fall appreciably despite a marked drop in the sodium. High potassium has been described in intestinal obstruction and in acute attacks of Ménière's disease.

Acids

Plasma Chloride

The value for plasma chloride is usually determined by titrating as silver chloride. A convenient

above, varies but little, a change in chloride must ordinarily be compensated for by an inverse change in bicarbonate, and vice versa. Thus, when chloride is low, bicarbonate is usually high. The outstanding exception to this statement is the case in which extraneous acids are present, for example, in diabetic coma. Similarly, after prolonged hyperventilation the low carbon dioxide content of the blood may be accompanied by low sodium and almost certainly by high chloride.

Normal values usually range from 100 to 110 milliequiv. per liter of plasma.

Low values, that is, 98 milliequiv. per liter—the urinary threshold—may be encountered in a salt-free diet, and the urine may be devoid of chloride. Starvation may occasionally reduce the value to 91 milliequiv, as may the sweating leading to heat cramps. After a meal the alkaline tide due to gastric acid secretion may be accompanied by a fall in plasma chloride of 3 milliequiv. On a larger scale, as in pyloric obstruction with repeated vomiting, loss of gastric hydrochloric acid may reduce the serum chloride to less than half its normal value. Indeed, tetany may result, accompanied by a high value for plasma bicarbonate. This obviously cannot occur with achlorhydria because then the vomitus contains approximately equal amounts of sodium and chloride. In diabetic ketosis, despite the accompanying dehydration, the values may fall to 86 or 96 milliequiv as the combined result of vomiting, diuresis, accumulation of oxybutyrate and acidosis. Although edema tends to be aggravated by administration of bicarbonate and salt, the change is usually registered by an increase in intercellular fluid rather than in sodium concentration. In pneumonia there may be a drop to 80 milliequiv, for which reason some clinicians

recommend giving salt up to the point of edema. Similarly, in eclampsia a low chloride concentration is common. The results in nephritis are variable, owing to opposing trends. With edema there may be retention of salt and water in disproportionate degrees so that low, normal or high concentrations of chloride may be found. In the absence of edema, a so-called "dry" retention of chloride may occur; or there may be a chloride deficit, with or without dehydration. In terminal uremia, normal or low chlorides are usual, depending on the extent of vomiting and the effect of the loss of the renal threshold. Accordingly, for the best therapy it is necessary to know simultaneously the total base (or sodium), chloride and carbon dioxide of the serum.³³

High values, up to 110 milliequiv. per liter, may be induced by giving 40 gm. of salt a day. In diarrhea the value is normal or slightly increased. Preceding a diuresis, whether spontaneous or due to mercurial diuretics, it may rise to 120 milliequiv. In acute or chronic glomerulonephritis or in gouty nephritis, there also may be a slight increase.

Infants show extraordinary fluctuations in various illnesses. In bronchopneumonia, values of 79 to 93 milliequiv. per liter have been reported, and in lobar pneumonia 74 to 100 milliequiv. Infantile tetany may show 78 to 100 and nutritional edema 75 to 101 milliequiv. Some of the most bizarre disturbances involving electrolyte balance occur in infants and children.³³

Blood Carbon Dioxide

Because the corpuscles contribute significantly to the binding of carbon dioxide under physiologic circumstances, it is justifiable to use whole blood for this determination. Detailed methods are given by Peters and Van Slyke.³ Nevertheless, in many laboratories plasma is being used. There is the additional complication that one may determine either the *content* at the time when sampled or the combining *capacity* after equilibration with a standard gas mixture like alveolar air. Furthermore, plasma gives different values depending on whether the red cells have been removed before or after equilibration—the so-called "true" or "false" plasma. It is essential, therefore, to know precisely with which combination of these possibilities one is dealing. Probably the most convenient arrangement is the gasometric determination by the Van Slyke apparatus³ of the carbon dioxide combining capacity of the whole blood when equilibrated at 37°C. with a gas mixture containing carbon dioxide at a tension of 40 mm. of mercury and oxygen at a tension of at least 110 mm. of mercury.

Normal values range from 22 to 30 millimols per liter, or approximately 50 vol. per cent.

Low values are commonly found in infantile di-

arrheas, in which treatment by Hartmann's solution³⁴ is preferable to the administration of saline alone. Of course, any reduction in total plasma base will tend to reduce bicarbonate. In severe diabetic coma, the total carbon dioxide may fall to 3 millimols per liter, or 7 vol. per cent. Low values are also found in uremic acidosis owing to the accumulation of inorganic acids (phosphate and sulfate). In hysterical hyperpnea enough carbon dioxide may be blown off to reduce markedly the total carbon dioxide, at least temporarily.

High values occur in emphysema owing to faulty ventilation. They are occasionally found after prolonged treatment with Sippy powders for peptic ulcer. When the value reaches 40 millimols per liter, tetany usually ensues; this concentration corresponds to the absorption (without excretion) of 40 gm. of sodium bicarbonate. Of special interest are paradoxical combinations of acidosis and a high total carbon dioxide, such as may be induced by rebreathing of gas mixtures rich in carbon dioxide. One may likewise find a paradoxical alkalosis associated with a low total carbon dioxide level in the blood, such as that induced by hyperventilation. Such combinations are likely to be overlooked in routine clinical medicine. This error may be avoided by the habitual use of total base, chloride and carbon dioxide in unusual cases involving electrolyte balance.³³ The determination of carbon dioxide in the alveolar air is also helpful if conditions are favorable.

Acidity (pH)

Although the acidity of the whole blood is influenced physiologically by the red cells, it must perforce be determined in plasma. It may be measured with approximate accuracy by the careful use of an indicator, using a comparator device.³⁵ It is better measured electrometrically in a laboratory equipped with a glass electrode³⁶ or similar device, or by the use of gasometric analyses involving carbon dioxide dissociation curves.³²

Normal values range from pH 7.35 to 7.48. Life can exist for only a short time below pH 6.9 or above 7.85.

Low values indicate acidosis, and at pH 7.0, acidotic coma sets in.

High values indicate alkalosis, and at pH 7.8, alkalotic coma occurs.

REGULATORS (VITAMINS, HORMONES, ENZYMES) *Plasma Vitamin A*

The value for plasma vitamin A may be estimated approximately by photoelectric colorimetry, but the problem is still in the investigative phase and normal values are debated. The same statement may be made for plasma carotene. In carotemia the increased color may be mistaken for

icterus, but the identification is easily made because the van den Bergh determination of bilirubin will be normal. Likewise, special identification of the ether-soluble carotene is possible through appropriate tests as described by Stueck, Flaum and Ralli.³⁷

Plasma Vitamin C

The value for plasma vitamin C is ordinarily determined by titrimetric³⁸ or colorimetric³⁹ analysis, involving Tillmann's oxidation-reduction indicator. The concentration in the plasma falls much sooner than that of the tissues in avitaminosis, and indeed falls rapidly in acute febrile infections. Analyses of the plasma may therefore produce false alarms because the tissues may still be moderately well supplied with vitamin when the plasma is devoid of it.

Normal values in the plasma or serum approximate 0.8 mg. per 100 cc., but wide variation in values is reported from different laboratories. Thus the plasma often contains 1.3 to 2.8 mg. and the red cells 0.8 to 1.7 mg. In persons without clinical scurvy the values may go at least as low as 0.1 mg. for considerable periods. In frank scurvy the value is approximately 0.

Plasma Vitamin K

Plasma vitamin K has assumed importance in cases involving the clotting of blood, as in malnutrition, jaundice and hemorrhagic diatheses. It is ordinarily determined in terms of the prothrombin clotting time. Several accurate methods are available, as discussed previously in the *Journal*,² but the so-called "bedside test" of Smith, Ziffren, Owen and Hoffman⁴⁰ serves for routine work. Normal values depend on the procedure involved.

Low values occur most frequently in jaundice, because the presence of bile is essential to the absorption of vitamin K by the intestine. Nevertheless, low values (prolonged prothrombin clotting time) may be encountered in other conditions. Among these are the chronic diarrheas, similar to those encountered in sprue, regional ileitis, hemorrhagic disease of the newborn and various diseases of the liver. The test is of great help, not only in diagnosis and in prophylaxis of hemorrhage, but also in following the effectiveness of therapy. In liver necrosis, the administration of vitamin K may fail to restore the plasma prothrombin level to normal.

Plasma Phosphatase

Alkaline phosphatase. The determination of this enzyme in plasma depends on the amount of organic phosphate converted into inorganic phosphate in a given time under standard conditions^{41, 42} Usually incubation for an hour or longer

is required. The values in the literature are confused because various laboratories have used different procedures and different units. Fortunately, the new Bodansky unit is close to the new Jenner-Kay unit.

Normal values range from 1.5 to 4 units, possibly 7. There is much clinical variation, but typical values follow: hyperparathyroidism 25 units; active localized Paget's disease, 5 to 20 units; active diffuse Paget's disease, 50 to 135 units; active rickets at four months to two years of age, 30 to 165 units. Although alkaline phosphatase is ordinarily employed in conditions involving bone disease, confusion may arise because high values are found in many cases of jaundice.⁴³ Thus with jaundice showing an icteric index above 15 one might possibly find an alkaline phosphatase of 40 units, but the values vary greatly.

Acid Phosphatase. Ordinarily there is only a little acid phosphatase in the plasma. This term means an enzyme that operates optimally in acid solution. Such an enzyme occurs in the prostate gland, however, and Gutman⁴⁴ has shown that in cancer of the prostate a high concentration of this enzyme may appear in the plasma. Such a finding obviously may be of high diagnostic value.

Serum Amylase

Serum amylase, an enzyme that accelerates the hydrolysis of starch or glycogen, has been determined by several methods. A convenient one is that used by Cole.⁴⁵ Each investigator employs his own system of units, so that standard values cannot be given. The most useful clinical finding is the extremely high serum amylase activity found almost invariably in acute pancreatitis. In the diagnosis of acute surgical conditions of the abdomen, this test may be of great value.

Plasma "Hormonal" Iodine

If care is taken to eliminate extraneous iodide, the organically bound iodine of the plasma offers a convenient method of studying thyroid disease.² Reliable practical methods are described by Salter.⁴⁶

Normal values range from 4 to 8 microgm. per 100 cc. (A microgram is one millionth of a gram.)

Low values, that is, from 0.5 to 3.5 microgm. per 100 cc., are encountered in myxedema and cretinism, and in polyglandular syndromes, like Simmonds's cachexia, that involve thyroid failure.

High values are found in hyperthyroidism (Graves's disease), in toxic nodular goiter and in some cases of acromegaly. Such values range from 8 to 18 microgm. per 100 cc. and possibly higher, depending on the degree of thyrotoxicosis. Long-standing cases of so-called "hyperthyroidism," however, may show normal iodine values, presumably

because the thyroïdal stores of iodine have been exhausted.

TECHNICAL DETAILS

The laboratory technician is frequently vexed by the careless preliminary handling of blood samples. The following are typical examples of mishandling that should be avoided: The container is dirty, or the stopper leaks. The blood is clotted. A huge excess of anticoagulant has been used, thus interfering with subsequent analytical procedures. The carbon dioxide content of a blood sample is requested, when inadequate—or no—precautions have been taken to avoid loss of carbon dioxide into the atmosphere. Calcium determination is requested in plasma treated with oxalate, which, of course, removes the calcium. Sodium oxalate is used as anticoagulant when analysis for sodium or for total base is requested. The blood is stale or hemolyzed when received at the laboratory. The patient had not been fasting when the blood was drawn.

* * *

In the foregoing synopsis it has been pointed out that clinical chemistry is merely the essence of physiological investigations in pathologic states. It has been emphasized that so-called "normal" values vary according to the procedure used in the laboratory in which they are determined. Therefore it is essential to discover the normal range under individual circumstances. It has also been pointed out that determinations in serum or plasma are usually preferable to determinations in whole blood, which is a mixture of cells and surrounding fluid. Proper interpretation of these values requires keen insight into physiologic mechanisms at work in disease, and such interpretation must be tempered constantly with common sense. The routine laboratory tests are subject to various fundamental as well as incidental errors, and consequently such data should not take precedence over clean-cut bedside observations. Laboratory data merely supplement careful clinical study of the patient in toto.

REFERENCES

- Folin, O. *Laboratory Manual of Biological Chemistry: With supplement.* Fifth edition. 368 pp. New York: D. Appleton-Century Co., Inc., 1934.
- Salter, W. T. Fundamental misconceptions involving clinical pathology. *New Eng. J. Med.* 222:143-148, 1940.
- Peters, J. P. and Van Slyke, D. D. *Quantitative Clinical Chemistry: Vol. I. Methods.* 1264 pp. *Interpretations.* Vol. II. 957 pp. Baltimore: Williams & Wilkins Co., 1931 and 1932.
- Priestley, H. and Hindmarsh, E. M. The blood urea and nitrogen output of Australian students. *M. J. Australia* 1:234, 1924.
- Möller, E., McIntosh, J. F. and Van Slyke, D. D. Studies of urea excretion. II. Relationship between urine volume and the rate of urea excretion by normal adults. *J. Clin. Investigation* 6:427-465, 1929.
- Mosenthal, H. O. and Hiller, A. The relation of the non-protein nitrogen to the urea nitrogen of the blood. *J. Urol.* 1:75-89, 1917.
- Folin, O. Improved method for determination of uric acid in blood. *J. Biol. Chem.* 86:179-187, 1930.
- Talbott, J. H. Serum urate in relatives of gouty patients. *J. Clin. Investigation* 19:645-648, 1940.
- Danielson, I. S. On the presence of creatinine in blood. *J. Biol. Chem.* 113:181-195, 1936.
- Folin, O. Supplementary note on new ferricyanide method for blood sugar. *J. Biol. Chem.* 81:231-236, 1929.
- Somogyi, M. Reducing non-sugars and true sugar in human blood. *J. Biol. Chem.* 75:33-43, 1927.
- Shaffer, P. A. and Somogyi, M. Copper-iodometric reagents for sugar determination. *J. Biol. Chem.* 100:695-713, 1933.
- Folin, O. Unclotted blood as basis for blood analysis. *J. Biol. Chem.* 86:173-178, 1930.
- Cannon, W. B. *Bodily Changes in Pain, Hunger, Fear and Rage.* Second edition. 404 pp. New York: D. Appleton & Co., 1929.
- Joslin, E. P., Root, H. F., White, P. and Marble, A. *The Treatment of Diabetes Mellitus.* Seventh edition. 783 pp. Philadelphia: Lea & Febiger, 1940.
- Houssay, B. A. Hypophysis and metabolism. *New Eng. J. Med.* 214:961-971, 1936.
- Himsworth, H. P. Diabetes mellitus: its differentiation into insulin-sensitive and insulin-insensitive types. *Lancet* 1:127-130, 1936.
- Stoddard, J. L. and Drury, P. E. Titration method for blood fat. *J. Biol. Chem.* 84:741-748, 1929.
- Windaus, A. L. Ueber die Entgiftung der Saponine durch Cholesterin. *Ber. d. deutsch. chem. Gesellsch.* 42:238-246, 1909.
- Rhamey, B. W. and Adams, P. H. A new standard for the van den Bergh test. *J. Lab. & Clin. Med.* 13:87, 1927.
- Fiske, C. H. and Logan, M. A. Determination of calcium by alkalimetric titration: precipitation of calcium in presence of magnesium, phosphate, and sulfate. *J. Biol. Chem.* 93:211-226, 1931.
- Peters, J. P. and Eiserich, L. Influence of protein and inorganic phosphorus on serum calcium. *J. Biol. Chem.* 84:155-166, 1929.
- Fiske, C. H. and Subbarow, Y. The colorimetric determination of phosphorus. *J. Biol. Chem.* 66:375-400, 1925.
- Shock, N. W. and Hastings, A. B. Studies of acid-base balance of blood: characterization and interpretation of displacement of acid-base balance. *J. Biol. Chem.* 112:239-262, 1935.
- Van Slyke, D. D., Wu, H. and McLean, F. C. Studies of gas and electrolyte equilibria in the blood. V. Factors controlling the electrolyte and water distribution in the blood. *J. Biol. Chem.* 56:765-849, 1923.
- Consolazio, W. V. and Talbott, J. H. Determination of total base in biological material by electrodialysis. *J. Biol. Chem.* 132:753-767, 1940.
- Stadie, W. C. and Ross, E. C. A micro method for the determination of base-blood and serum and other biological materials. *J. Biol. Chem.* 65:735-754, 1925.
- Butler, A. M. and Tuthill, E. An application of the uranyl zinc acetate method for determination of sodium in biological material. *J. Biol. Chem.* 93:171-180, 1931.
- Fiske, C. H. and Litareczek, G. A new method for potassium. *J. Biol. Chem.* 67:xvii, 1926.
- Gamble, J. L. *Chemical Anatomy, Physiology and Pathology of Extracellular Fluid.* 95 pp. Boston: Department of Pediatrics, Harvard Medical School, 1939.
- Van Slyke, D. D. The determination of chlorides in blood and tissues. *J. Biol. Chem.* 58:523-529, 1923.
- Henderson, L. J. *Blood: A study in general physiology.* 397 pp. New Haven: Yale University Press, 1928.
- Butler, A. M. Electrolyte and water balance. *New Eng. J. Med.* 220:827-834, 1939.
- Harimann, A. F. Treatment of severe diabetic acidosis: comparison of methods, with particular reference to use of racemic sodium lactate. *Arch. Int. Med.* 56:413-434, 1935.
- Shock, N. W. and Hastings, A. B. A micro-technique for the determination of the acid-base balance of the blood. *Proc. Soc. Exper. Biol. & Med.* 26:780, 1929.
- Nims, L. F., Marshall, C. and Burr, H. S. The measurement of the pH in circulating blood. *Science* 87:197, 1938.
- Stueck, G. H., Flaum, G. and Ralli, E. P. Serum carotene in diabetic patients, with clinical evidence of carotenemia as determined by photo-electric colorimeter. *J. A. M. A.* 109:343, 1937.
- Pijon, M. and Klemperer, F. Determination of blood ascorbic acid. *J. Clin. Investigation* 16:443-445, 1937.
- Mindlin, R. L. and Butler, A. M. Determination of ascorbic acid in plasma: macromethod and micromethod. *J. Biol. Chem.* 122:673-686, 1938.
- Smith, H. P., Ziffren, S. E., Owen, C. A. and Hoffman, G. R. Clinical and experimental studies on vitamin K. *J. A. M. A.* 113:380-383, 1939.
- Bodansky, A. Notes on determination of serum inorganic phosphate and serum phosphatase activity. *J. Biol. Chem.* 120:167-175, 1937.
- Jenner, H. D. and Kay, H. D. Plasma phosphatase: clinical method for determination of plasma. *Brit. J. Exper. Path.* 13:22-27, 1932.
- Flood, C. A., Gutman, E. B. and Gutman, A. B. Phosphatase activity, inorganic phosphorus and calcium of serum in disease of liver and biliary tract: study of one hundred and twenty-three cases. *Arch. Int. Med.* 59:981-999, 1937.
- Gutman, A. B. and Gutman, E. B. "Acid" phosphatase occurring in serum of patients with metastasizing carcinoma of prostate gland. *J. Clin. Investigation* 17:473-478, 1938.
- Cole, W. H. Acute pancreatitis: with special reference to pathogenesis and diagnostic value of blood amylase test. *Am. J. Surg.* 40:245-259, 1938.
- Salter, W. T. *The Endocrine Function of Iodine.* 351 pp. Cambridge: Harvard University Press, 1940.

In addition to the two-volume treatise by Peters and Van Slyke,³ the following books and articles are useful sources of reference for methods and their interpretation:

- Bodansky, M. and Bodansky, O. *Biochemistry of Disease.* 684 pp. New York: Macmillan Co., 1940.
- Hunter, F. T. *Laboratory Manual of Massachusetts General Hospital.* Third edition. 119 pp. Philadelphia: Lea & Febiger, 1939.
- Abrahamson, E. M. *Office Clinical Chemistry.* 245 pp. New York and London: Oxford University Press, 1940.
- Myers, V. C. and Muntwyler, E. Chemical changes in blood and their clinical significance. *Physiol. Rev.* 20:1-36, 1940.
- Talbott, J. H. Interpretation of clinical chemical procedures. *Ohio State M. J.* 35:137-146, 1939.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27011

PRESENTATION OF CASE

A twenty-four-year old woman entered the hospital complaining of abdominal pain, nausea and vomiting of approximately nine days' duration.

The patient was first admitted to this hospital seven years before her present illness with a history of chronic cough and sputum aggravated by frequent upper respiratory infections. The cough gradually became more severe, the sputum more copious and occasionally associated with hemoptysis. Physical and x-ray examinations confirmed the diagnosis of bronchiectasis in the left lower lobe. The left phrenic nerve was crushed, but there was no alleviation of symptoms, so that fourteen months later the first stage of a lobectomy was performed. Six months later the lobe was removed and an uneventful convalescence followed. The patient remained well and active for the next five years; she married and bore one child. Following her pregnancy she had bilateral breast abscesses.

Three weeks before admission she returned to the Out Patient Department with the following story. Two months previously she started to suffer from migratory pains in the ankles, knees, wrists, fingers, elbows, shoulders and back and the first three of these became red, swollen and tender. The tips of the fingers were blanched and sore. In addition she felt weak and tired, and noticed some palpitation and shortness of breath. She stated that the lymph nodes in her neck were swollen occasionally and that she had lost 12 pounds in weight. For the two weeks prior to admission she had frequency of urination, with nocturia once a night. On examination the patient walked with difficulty because of the pain in her joints. The gums were tender and bleeding, and the anterior cervical lymph nodes tender. The thyroid gland was somewhat enlarged. The middle fingers of both hands were spindle shaped; both ankles and the left knee and wrist were swollen, warm and tender, without limitation of movement. The heart was not enlarged, but there was a loud systolic murmur heard best at the pulmonic area; the blood pressure was 110 systolic, 70 diastolic. The pulmonic second sound

was greater than the aortic second. The temperature was 99.4°F, the pulse 98. Examination of the urine showed a + test for albumin with 4 red and 12 white blood cells per high power field. The patient was ordered to bed for one month on a high caloric, high vitamin diet, but returned nine days later. It appeared that after she had been seen in the Out Patient Department she noticed in her left flank a dull ache that soon shifted to the left upper quadrant and became very severe. This pain kept her awake, was not relieved by position and was accompanied by nausea, vomiting and constipation. She felt feverish and had one chill. She took a laxative and felt much better after a bowel movement. In addition there were burning, frequency and urgency on urination. Although the pain persisted as a dull ache, it did not return in all its severity until the morning of admission, when it was again accompanied by nausea and vomiting. The joint symptoms had improved remarkably and at the time of admission had disappeared completely. She had lost 19 pounds in the previous two months.

The patient had had her tonsils and adenoids removed fourteen years previously. The family history was irrelevant.

On examination the patient was well developed and well nourished, but pale, and she appeared chronically ill. She was very restless and complained of pain in the left flank. The head, eyes, ears, nose and throat were normal. Lobectomy scars were present in the left chest posteriorly and laterally. The heart was not enlarged to percussion and the rhythm was normal, but there was a loud systolic murmur over the pulmonic area and a faint systolic murmur at the apex. The pulmonic second sound was greater than the aortic second; the blood pressure was 110 systolic, 70 diastolic. The left diaphragm was high, the lungs were clear, and there was no shift of the mediastinum. The abdomen was soft, but an area of tenderness was present high in the left flank near the costovertebral angle, with moderate muscle spasm in this area. Pelvic and rectal examinations were negative except for a moderate cystocele. The reflexes were active and equal, and all joints appeared normal.

The temperature was 100°F, the pulse 90, and the respirations 20.

Examination of the urine showed a ++++ test for albumin with 5 to many white blood cells and 10 to 30 red blood cells per high power field. The specific gravity varied from 1.002 to 1.012. Several cultures grew variously colon bacilli, *Staphylococcus aureus*, *Staph. albus* and diphtheroids. Examination of the blood showed a red-cell count of

3,250,000 with a hemoglobin of 55 per cent, and a white-cell count of 14,000 of which 81 per cent were polymorphonuclears, 17 per cent lymphocytes and 2 per cent monocytes, with no eosinophils or basophils. The nonprotein nitrogen of the blood serum was 55 mg. per 100 cc., and a blood culture and a blood Hinton test were negative. The serum protein was 5.8 gm., the phosphorus 7.1 mg., and the calcium 8.7 mg. per 100 cc.; the blood chlorides were 89.8 milliequiv. per liter, and the carbon dioxide combining power was 19.8 milliequiv. per liter. A phenolsulfonephthalein test showed no excretion of the dye in fifteen minutes, and less than 5 per cent in thirty minutes. An intravenous pyelogram showed a large quantity of gas in the small and large bowels, without definitely dilated loops. The kidney outlines were indistinct but sharp where visible; both were grossly enlarged but showed no lobulation. The intravenous dye was excreted poorly. The left kidney pelvis was not definitely visualized; the right pelvis was moderately enlarged, and the calyces appeared distorted, but normal in size. A bilateral retrograde pyelogram showed slight dilatation of the left kidney pelvis and calyces. The right kidney calyces showed multiple irregular deformities. A chest plate showed the old resection of the left seventh and eighth ribs and a high diaphragm on the left side. The left costophrenic angle was obliterated.

A cystoscopic examination showed a normal bladder and normal ureteral orifices. The catheters passed easily into the kidneys, and a normal drip of clear urine was obtained on the right, but none on the left. On the tenth hospital day the patient started to hiccup and vomited a gray fluid, which was guaiac positive. The nonprotein nitrogen had risen to 110 mg. per 100 cc. Four days later catamenia began two weeks early, but the flow ceased within two days. Sixteen days after admission, the patient complained of a "white sheet" in front of her eyes and ringing in the ears. Ophthalmoscopic examination was negative, and she was able to count fingers. A few minutes later she became comatose and rigid, with stertorous breathing, and blood-flecked saliva oozed from her mouth. Consciousness quickly returned with little subjective change, and though she complained of weakness in the lower extremities physical examination was negative except for a questionable temporal-field defect on the left; the blood pressure was 140 systolic, 90 diastolic. The patient appeared to improve for a day, but then became drowsy, and purpuric spots were noticed about the elbows. The next day she had a hemoptysis and complained of a sharp chest pain; bron-

chial rales were heard over the entire right chest. By the following day she was semicomatose, with rapid respirations and slight cyanosis. The pulse rate was 110, and the blood pressure 140 systolic, 90 diastolic; rales were present at both lung bases. The nonprotein nitrogen was 87 mg. per 100 cc., with a carbon dioxide combining power of 16.9 milliequiv. per liter. In the evening she suddenly coughed up 100 cc. of pure blood, and died two and a half hours later, three weeks after admission.

DIFFERENTIAL DIAGNOSIS

DR. WALTER BAUER: I had thought that we members of the arthritic group saw all the patients who came into the medical wards with arthritis. However, this is one we did not see. Since reading the report, I wish we had.

I doubt if the events chronicled in the first paragraph of this patient's history have anything to do with the present illness.

As I see it, my problem is a twofold one: first, to establish if possible the nature of the lesion responsible for the renal failure, and secondly, to determine whether the antecedent arthritis was or was not related to the renal disease. In other words, should I attempt to explain the entire clinical picture on the basis of one disease or should I make several diagnoses? In a young adult, it is usually safer to make one diagnosis. In adults above fifty, it is much more hazardous.

I first thought this patient suffered from pyelonephritis with obstruction of the left ureter, but the subsequent findings do not bear out this diagnosis. The absence of chills and the scanty evidence of fever would be most unusual, and we do not associate any type of arthritis with pyelonephritis.

Bilateral polycystic disease of the kidneys with an associated secondary gouty arthritis would be considered by some. I should hesitate to make such a diagnosis, because I have never been willing to believe that there is such a disease as secondary gouty arthritis, and because the x-ray findings are not like those of polycystic disease of the kidneys.

Could this patient have had nephritis? I should say that she could. The enlarged kidneys would rule out a diagnosis of chronic glomerular nephritis, with secondary hyperplasia of the parathyroid glands and renal osteitis fibrosa cystica. However, enlarged kidneys are seen in acute and subacute glomerular nephritis.

There are many reasons why I should prefer to stick to this diagnosis. It would help explain many other features of this patient's disease. I

believe that she suffered from recurrent attacks of pulmonary edema, a not uncommon finding in acute nephritis. The pulmonary changes occurring under such conditions can be responsible for confusing and bizarre x-ray findings. They may vary greatly from day to day. This type of pulmonary edema is probably another manifestation of the diffuse capillary damage that can take place in acute nephritis.

Can we possibly connect the arthritis with the nephritis? Coburn* has described nephritis as a complication of rheumatic fever. It is usually very mild, and the diagnosis rests largely on the urinary findings. I doubt if it ever progresses to a stage where renal failure would be evident. There are no findings in this record to suggest that the patient was suffering from periarteritis nodosa, nor are the renal findings consistent with this diagnosis. If she had rheumatoid arthritis and nephritis, I should not consider them causally related. The joint involvement was symmetrical, a characteristic finding of rheumatoid arthritis but a rare finding in the other arthritides. However, one very rarely sees red, hot joints in rheumatoid arthritis.

I shall try to rebuild the clinical picture in the following manner: first, a hemolytic streptococcal infection (not recorded in the clinical record); secondly, a specific infectious arthritis resulting therefrom; and finally, the development of an acute glomerular nephritis with complicating pulmonary edema. The sudden exitus may have been due to a cerebral hemorrhage or a pulmonary infarct.

DR. AUBREY O. HAMPTON: The right kidney is much more clearly outlined than the left and is certainly enlarged. After the intravenous dye we see the right kidney pelvis faintly, whereas the left is not visible. In the retrograde pyelograms there are deformities of the right pelvis, but these correspond more closely to the picture of a hypertrophied kidney than to that of a polycystic one. It must be admitted that after a unilateral nephrectomy the pyelogram of the remaining kidney, which undergoes considerable compensatory hypertrophy, may become difficult to distinguish from that of a polycystic kidney. In this case, however, polycystic disease is ruled out by the absence of deformity of the left pelvis. The left ureter is well demonstrated and is normal. The lungs are normal except for a shadow that I interpret as the stump of the resected lower lobe. The diaphragm is high, probably because of the resected lobe. The heart is normal.

*Coburn, A. P. *The Factor of Infection in the Rheumatic State*. 228 pp. Baltimore. Williams & Wilkins Co., 1931. P. 34.

CLINICAL DIAGNOSES

Pyelonephritis with uremia.
Pulmonary infarct?
Pulmonary edema?

DR. BAUER'S DIAGNOSES

Acute specific infectious arthritis (probably due to a hemolytic streptococcal infection).
Late acute or early subacute glomerular nephritis.
Pulmonary edema.
Cerebral hemorrhage?
Pulmonary infarct?

ANATOMICAL DIAGNOSES

Subacute glomerulonephritis.
Cerebral hemorrhage, right occipital lobe.
Periarteritis nodosa.
Hemorrhagic pulmonary edema.
Bronchiectasis, right lower lobe.
Operative scars: lobectomy, left lower lobe; phrenectomy, left.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: At the post-mortem examination we found a pair of very large kidneys, weighing 450 gm., with capsules that stripped with difficulty and left slightly granular surfaces, in other words a subacute nephritis. On microscopic examination all the glomeruli were found to be involved in the typical manner of diffuse glomerulonephritis. There was no evidence of pyelonephritis or of any obstruction in the urinary tract. I cannot explain why the intravenous dye was excreted only by the right kidney. The precipitating factor in death was a cerebral hemorrhage, and that report of questionable visual defect on the left was probably quite correct, because the patient had a large hemorrhage in the right occipital lobe. There was pulmonary edema. There was also some evidence of chronic infection in the base of the right lung, a mild degree of bronchiectasis similar to what had led to operation on the other side. When the microscopic sections came through, we were surprised to find something else. This was most obvious in the spleen, where the arteriole in each Malpighian corpuscle showed a periarterial granulomatous process. Further search quickly revealed numerous arterioles in the pancreas and in the systemic musculature, with lesions typical of periarteritis nodosa.

There certainly was nothing in the clinical history or physical findings remotely pointing toward such a diagnosis. Dr. Bauer raised the question of

rheumatic fever. The valves were quite negative, and we could find no Aschoff bodies in the myocardium; consequently, we have no positive evidence of it. On the other hand, periarteritis nodosa is seen in association with rheumatic fever with significant frequency, so that one might argue that the periarteritis was evidence of rheumatic infection. I do not know how that can be disproved.

DR. BAUER: Do you think there is any possibility of explaining everything on the basis of acute nephritis following a hemolytic streptococcal infection, which had caused the antecedent infectious arthritis? That would explain everything that occurred in this patient.

DR. MALLORY: That explanation is certainly adequate for everything except the arterial lesions. They bring up the old problem. Is periarteritis nodosa a specific disease with a single though unknown etiology, or is it possible that such lesions can develop in the course of a variety of different pathologic entities? Reliable evidence that they occur in any disease of known etiology is lacking, so that I am still slightly predisposed in favor of the first hypothesis.

CASE 27012

PRESENTATION OF CASE

A forty-nine-year-old Swedish machinist entered the hospital complaining of increasing shortness of breath and substernal pain of two years' duration.

At nine years of age, the patient spent one week in a hospital because of swelling of his feet, but could recall no other features of this illness. At fourteen he fell into the water during the winter, and for the next two weeks his feet and ankles were swollen. Each spring thereafter the swelling recurred and lasted for about a week. The patient immigrated to the United States at the age of twenty-two, and at this time noticed slight palpitation, but was able to do manual labor without distress. At twenty-seven he spent eight weeks in bed with the "flu." Two years before entry he first noticed the onset of shortness of breath and substernal pain with palpitation. In the last four months the attacks were frequent and often lasted for several minutes. The patient continued to work steadily in a shoe factory until eight weeks before entry, when his physician told him to "take it easy." He worked spasmodically until the time of admission, when an increase in the above symptoms, in addition to insomnia and anorexia, forced him to give up. He stated that he had had frequent nosebleeds for the two or three years prior to entry.

The family history was irrelevant.

On examination the patient was a well-developed, slightly jaundiced man who was dyspneic and appeared chronically ill. The neck veins were distended. Examination of the heart revealed marked enlargement to the left and a rapid, completely irregular impulse. There was a systolic murmur at the apex, and diastolic and systolic murmurs at the left sternal border. The blood pressure was 120 systolic, 80 diastolic. The lungs were clear. The liver was slightly tender and palpable four fingerbreadths below the right costal margin. There was no edema of the extremities.

The temperature was normal, the pulse 70, and the respirations 28.

Examination of the urine showed a +++ test for albumin, with frequent hyaline and granular casts. The blood showed a red-cell count of 4,470,000 with a hemoglobin of 14.5 gm. (photoelectric-cell technic), and a white-cell count of 15,600 with 70 per cent polymorphonuclears. The nonprotein nitrogen of the blood serum was 59 mg., and the van den Bergh 4.7 mg. per 100 cc. A blood Hinton test was negative.

X-ray examination of the chest showed a grossly enlarged heart, the enlargement affecting all chambers. The hilar shadows were prominent, and there was hazy density extending out into both mid-lung fields. At a subsequent examination there was diffuse dilatation of the pulmonary vessels without fluid in the pleural cavities. The auricles were grossly dilated, and the apex of the heart was thick and blunt. The aorta was relatively prominent. No areas of calcification were seen in the region of the valves or the pericardium. The electrocardiogram showed auricular fibrillation; there was slight to moderate left-axis deviation, and the QRS interval in leads 1 and 3 measured from 5 to 6 mm.

Following digitalization the ventricular rate was slowed, the heart decreased in size and the non-protein nitrogen of the blood serum dropped to 25 mg. per 100 cc. At times the patient was restless and nervous, apparently because of dyspnea. A decrease in fluid output led to the use of Salycan, with satisfactory diuresis. A phenolsulfonephthalein test at this time gave a 20 per cent excretion in fifteen minutes, 50 per cent in thirty minutes. The patient gradually improved and one month after admission was allowed to sit in a chair and walk about the ward. Although this activity was performed without distress, he became dyspneic with any increase in exercise. Six weeks after admission he began to go downhill, gradually became confused and disorientated, and developed Cheyne-Stokes breathing and sacral edema, with an increased pulse rate. The tem-

perature rose abruptly to 101°F. and then to 104 with a white cell count of 13,700, but the lungs were still clear. One week later the patient became semicomatose, and he died the next day, seven weeks after admission.

DIFFERENTIAL DIAGNOSIS

DR. PAUL D. WHITE: We should like to know more, particularly in regard to the details of the shortness of breath and of the substernal pain. We should also like to know whether that substernal pain was related to effort or came on in paroxysms when the patient was in bed. It seems to have been a rather indefinite pain, which might or might not have been angina pectoris.

A forty-nine-year-old man may have substernal pain and dyspnea due to either coronary disease or syphilitic aortitis. These are the two types of heart disease that come to mind first. Of course, too, he might have had a condition that had been present since early life. The swelling of the feet at the ages of nine and fourteen may have been due to a variety of things, but we naturally think of rheumatic fever. "Each spring thereafter the swelling recurred and lasted for about a week." Spring is the time, of course, when we might expect recurrence of a rheumatic infection. We should like to know if there was any statement about pain, as well as swelling of the feet.

DR. BENJAMIN CASTLEMAN: There was none.

DR. WHITE: Generally joint pain is more pronounced than swelling in acute rheumatic infection, but sometimes there is surprisingly little of either. Finally, there is a suggestion of active rheumatic fever in the story of repeated nosebleeds, but we cannot consider it a reliable indication. Rheumatic fever is not rare in Sweden, and rheumatic heart disease is frequently found throughout northern Europe.

"At twenty-seven he spent eight weeks in bed with the 'flu.'" That was twenty-two years before admission, and would bring it about the time of the great influenza epidemic. He probably had "flu" and pneumonia with it.

We may guess that the patient had had recurrent attacks of rheumatic fever, but up to the time of his immigration to this country he had had no symptoms of heart disease other than palpitation, too minor a symptom to be of importance. Since entering this country he had been quite active in manual labor. He was either a casual or a stoical Swede, I should say, certainly not neurotic, and probably rather neglectful of his health, since he continued to work despite his symptoms during the last two years.

I should like to know why he had insomnia,

also if the anorexia occurred when he began to be congested and to have dyspnea. Insomnia is sometimes due to dyspnea or orthopnea. I have seen patients benefited more by digitalis than by hypnotics.

Auricular fibrillation is evident. Its onset may have been the precipitating cause of his increase of symptoms during the past two years. It is a point against syphilis, and also against coronary disease at this time.

The systolic murmur at the apex is not very important, except that it means that there is something wrong. Even if it is loud, such a murmur may be the result of functional mitral regurgitation without any intrinsic heart disease. The diastolic and systolic murmurs at the left sternal border are another thing. What they mean we cannot be sure—probably aortic regurgitation. Most patients who have aortic regurgitation with a diastolic murmur along the left sternal border have also a systolic murmur.

The blood pressure measurement is evidence against a diagnosis of free aortic regurgitation. There is no increase in pulse pressure, so that we may assume that the aortic regurgitation causing this murmur was slight or that the murmur was due to pulmonic regurgitation. Pulmonic regurgitation may occur secondary to mitral stenosis, but we should find evidence of marked stenosis before that happens, and no such evidence is present.

"Examination of the urine showed a +++ test for albumin, with frequent hyaline and granular casts." That is not a diagnostic finding, it may be merely a part of the congestion.

"The nonprotein nitrogen of the blood serum was 59 mg, and the van den Bergh 47 mg per 100 cc." They are elevated, but neither one of itself is diagnostic evidence of kidney or liver disease.

"A blood Hinton test was negative." That is a very important point, because with a man of this age aortic regurgitation brings to mind syphilitic aortitis. The chances are nine to one that there is no aortitis in the presence of a negative Hinton test.

There was an increase in the shadow of the pulmonary vessels during life, which is not shown in the post-mortem film. That may be due to failure of the left ventricle rather than to pulmonary disease or mitral stenosis.

The patient had quite a good recovery, but slow. It was a month before he was allowed to sit up.

"Six weeks after admission he began to go down hill, gradually became confused and disorientated, and developed Cheyne-Stokes breathing and sacral edema, with an increased pulse rate." Why this

disappointing development? He was getting on all right, and for no obvious reason he began to do poorly, with increasing pulse rate and cardiac failure, despite good therapy. Something new had happened. Was it infection, or possibly infarction? If it was infection, might it be recurrent rheumatic infection? There is no indication of subacute bacterial endocarditis, which is rare in the presence of auricular fibrillation. There may be rheumatic endocarditis or infarction of lungs without physical signs. There may even be myocardial infarction without symptoms or signs.

To sum up, let us take the known findings first. The patient had a big heart, auricular fibrillation and total heart failure. Those are the three things that are quite clear. He probably had aortic regurgitation. Once in a while there may be aortic regurgitation due to syphilitic aortitis, without valve deformity. A dilatation of the aortic ring may account for insufficiency of the valve, which will not be found at autopsy. We may know it is there clinically, but we do not put down organic aortic regurgitation as an essential finding at autopsy. Mitral regurgitation, with or without mitral valve disease, was present. We know that the patient had a big heart, and he might have had mitral regurgitation secondarily, but whether or not he had valve disease we cannot tell. With failure, a big heart may have mitral stenosis (or aortic stenosis) of a considerable degree without the characteristic murmurs. Finally, he may have had terminal pulmonary infection or infarction. In favor of infarction is the jaundice and the elevated serum van den Bergh.

Now comes the difficult problem, namely, the question of etiology. The best bet in view of the childhood history, the aortic regurgitation and the auricular fibrillation is rheumatic heart disease, acute and chronic. Coronary disease is less likely, and if present is superimposed. We do not see auricular fibrillation so frequently from coronary insufficiency, and we expect death more suddenly. Syphilitic aortitis is possible but not probable; it may be a complication. We have had patients with rheumatic heart disease and syphilitic aortitis combined, but I do not believe that diagnosis is more than a possibility here. Syphilitic aortitis and subacute bacterial endocarditis must be considered as unlikely possibilities. I should say that there was a complicating infection or infarct, with pulmonary infarction as a first guess.

DR. HOWARD B. SPRAGUE: I am glad to have Dr. White go through the same course of thought that I did on seeing this patient. He came to the Out Patient Department and was admitted on the service. One of the admission diagnoses was coro-

nary disease. He had rapid auricular fibrillation, and it was very difficult to make out anything in the examination of the heart. A house officer noted a systolic murmur. When I examined the patient a little later I made the following note in the history:

The history suggests repeated rheumatic infection of the ankles and feet in childhood. His recent progressive dyspnea and palpitation may have been brought on by auricular fibrillation, which he now shows. He has a big, forceful heart with a systolic murmur at the apex and a systolic and diastolic at the left sternal border. I believe he has a rheumatic heart with mitral regurgitation, and possibly some stenosis, and aortic regurgitation, with again a question of stenosis. The fever suggests active endocarditis, pulmonary embolism or phlebitis.

He was digitalized, given mercurials, and during the next three or four days the murmurs became obvious on examination. There was a note of a systolic murmur at the aortic area, without any thrill. He then, as has been recounted, failed to make satisfactory progress, and again we asked if this were active rheumatic infection in the heart or in the lung or multiple small pulmonary infarcts, or thrombosis elsewhere in the body that we could not discover.

DR. WHITE: Did the aortic systolic murmur become more distinct when he improved?

DR. SPRAGUE: Yes.

DR. WHITE: It raises the question of aortic stenosis, of course. It may be very difficult to detect aortic stenosis in the presence of congestive failure because of the decrease of blood flow. I should like to add the diagnosis of aortic stenosis as a possibility here.

CLINICAL DIAGNOSES

Rheumatic heart disease, with combined aortic and mitral valvular lesions.
Acute bacterial endocarditis?
Cavernous sinus thrombosis?
Cerebral emboli?

DR. WHITE'S DIAGNOSES

Rheumatic heart disease, with aortic regurgitation, ? aortic stenosis and relative mitral regurgitation.
Hypertrophy of the heart.
Auricular fibrillation.
Pulmonary embolism or infarction.
Chronic passive congestion.

ANATOMICAL DIAGNOSES

Aortic stenosis, calcareous.
Septicemia (hemolytic streptococcus).
Cerebral and cerebellar degeneration.
Cardiac hypertrophy.

Mural thrombus, right auricular appendage.
Pulmonary infarction, recent.
Chronic passive congestion of lungs, liver and spleen.
Arteriosclerosis, coronary and aortic.
Icterus.

PATHOLOGICAL DISCUSSION

DR. CASTLEMAN: At autopsy this man had an unusually large heart, weighing 800 gm. There was hypertrophy and dilatation of all chambers. The mitral valve was perfectly normal in appearance, although it measured 12.5 cm. in circumference. There was no thickening of the margins or of the chordae tendineae to suggest rheumatic infection. The aortic valve showed marked stenosis of the calcareous type, with a lumen that admitted the tip of the index finger, probably 0.5 cm. in diameter. The valve itself measured 4 cm. in circumference. Almost all the deposits of calcium were on the sinus side of the cusps, and the appearance was characteristic of the Mönckeberg type of calcific aortic stenosis. There was no intercalation of the cusps at their commissures, such as is seen in typical rheumatic endocarditis. There were no other valvular lesions. The coronary arteries showed a fairly extensive arteriosclerosis, but no evidence of occlusion. Microscopically there were small foci of scarring in the myocardium, which may have accounted for his anginal pain, although we have seen cases of aortic stenosis alone without coronary disease associated with an-

ginal pain. The lungs had several infarcts at both lower lobes, the emboli probably arising from mural thrombi in the right auricular appendage. The leg veins were not examined. The combination of congestion in the liver, which was moderately severe, and pulmonary infarction adequately explains the jaundice.

It is quite possible that the disease the patient had in childhood was not rheumatic fever but some other infection that may have involved the aortic valve.

DR. WHITE: You would agree that there was probably an infectious form of aortic-valve involvement before the calcification?

DR. CASTLEMAN: Yes. Whether or not it was rheumatic, I am not sure.

DR. SPRAGUE: After Dr. Castleman found this, we went back over the autopsy cases of aortic stenosis to see if the presence of auricular fibrillation had often confused the diagnosis of aortic stenosis. I think that this can be said to be true. Rapid auricular fibrillation with severe failure, uncontrollable by digitalis, may obscure the characteristic features of the murmur and thrill at the aortic area, and the diminished aortic second sound may be erroneously attributed to cardiac failure alone.

DR. WHITE (later note): The apparent, insistent history of recurrent rheumatism in this patient favors, I think, rheumatic infection as responsible for the aortic stenosis, with superimposed calcification.

The New England Journal of Medicine

Formerly the

Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of

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MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

THE NEW YEAR

NEARLY twenty centuries ago an apparently new star of great magnitude was observed in the east; whether this was a new comet or the conjunction of two or more heavenly bodies is today of relatively little importance. What is of significance is the belief that this star was the celestial sign of a new order beginning in the eastern world—an order based on the humanity of man to man under the leadership of the founder of Christianity.

The season of Christ's birth is probably not exactly known, nor is it of any great importance. It is perfectly natural, however, that it should have finally been placed, as accurately as the early astronomers were capable of determining the occasion, at the time of the new year. It is an acci-

dent that both Christmas and the New Year should have been established on dates that follow the winter solstice by several days; it is no accident that they should have been so closely linked together at that period of the year when the retreating sun pauses before commencing its northward journey, and the darkness of the world begins to give way before the promise of light.

That the physical illumination of the world should be in this way identified with the spiritual enlightenment of mankind seems peculiarly fitting, and it is altogether proper that our festival season of greatest solemnity and yet of greatest joy should be thus annually renewed.

This year, curiously enough, when some of the darkest days through which Christianity has passed are so recent in our memories, again a new star has appeared; this time in the west. We do not dare allow our hopes to leap too high, or our emotions to outride our reason, but if ever an omen for a new year should be revealed, this is the year when it would be most welcome.

VIRUS PNEUMONIA AND Q FEVER

WELCOME indeed is the news that the causative agent of a number of puzzling cases of atypical pneumonia, due to none of the common pathogenic bacteria, has finally been isolated and identified. This information comes from two different sources,^{1, 2} and the reports appeared almost simultaneously.

In recent years, with the increasing interest in the etiologic aspects of pneumonia in relation to specific serotherapy and chemotherapy, many physicians in widely scattered localities have noted numerous cases of pulmonary infections of varying severity, but usually not fatal, in which the causative agent has not been determined by ordinary bacteriological methods. Furthermore, with the highly organized health services now available in many large universities and hospitals, it is not surprising that many of these cases of so-called "pneumonitis" or "atypical bronchopneumonia" are reported as occurring among university students and hospital personnel. Another important

factor in the recognition of these atypical pneumonias is the increasing use of roentgenograms of the chest in patients with acute febrile systemic diseases, even when symptoms of pulmonary involvement are minimal or absent.

The reported cases have followed a more or less characteristic clinical course. This has been described recently by several observers, each of whom has reported outbreaks in different parts of this country. One of the two most recent epidemics attacked fifteen employees in the laboratories of the National Institute of Health in Washington, one of whom died.¹ All these patients had high temperatures; profuse sweating frequently occurred, but true chills were rare. They felt ill and exhausted but did not have the breathing difficulty of patients with true pneumonia, or the severe body aches and pains of those with influenza. X-ray examination of the chest was found to be necessary to detect specific lesions in the lungs. It is stated, "A comparison of the clinical features and physical findings in these cases with various series reported from other sections of the United States in the past few years reveals suggestive similarities." Laboratory investigation revealed a rickettsia very similar to the one that causes Q fever in Australia. It was isolated from the blood of two of the recovered cases, and from the spleen of the fatal case.

Q fever was first described in Queensland in 1937.² A species of *Rickettsia* was recovered from cases of this disease and was shown to be distinct from other known rickettsiae.⁴ Work on this particular disease has been in progress at the National Institute of Health since the spring of 1938; however, not one of the fifteen cases in the recent epidemic occurred in the wing of the building where the experimental work on Q fever was being conducted. Even more remote is linking of these cases to the recovery by officers of the United States Public Health Service, from ticks gathered in Montana, of a rickettsia that caused infection in man and was shown to be very closely related to that of Q fever.⁵

It is interesting that the clinical syndrome and the epidemiology of Q fever in Australia and of

the pneumonitis observed in this country differ in some important respects. Pulmonary signs or symptoms have not been recognized in the former cases, although other features, particularly the type of fever and the severe headache, have been similar. It is possible, however, that pulmonary lesions passed unnoticed because the opportunities for roentgenography were much more limited than they are in America. Both the manifest and the latent Australian cases occurred almost entirely among butchers working in abattoirs, among foresters and among the members of the staffs of laboratories where work with the virus was being conducted. The bandicoot, a common rodent of the Australian bush, was shown to be susceptible and to be one of the reservoirs of infection, and one of the ticks commonly found in the vicinity was proved to be capable of serving as a vector.

The success of previous attempts to isolate a virus from cases of atypical pneumonia in this country was, at most, only suggestive.⁶ Just after the publication of the studies at the National Institute of Health, however, there appeared a report of an investigation conducted by the International Health Division of the Rockefeller Foundation.⁷ These workers recorded the isolation of a filterable virus from the pharyngeal washings of four patients with acute pneumonitis that was capable of producing pulmonary consolidation following intranasal inoculation in the wild mongoose. The etiologic relation of the virus to the human and the experimental disease was established by demonstrating the development of neutralizing antibodies in the course of convalescence from the infection. The mongoose—an animal similar to the ferret, which has been so helpful in the studies of influenza—is not susceptible to known strains of influenza virus. Importation of the animal into this country is prohibited, so that the investigations were carried out in Kingston, Jamaica, with infected materials obtained in New York City.

It remains to be seen whether the workers at the National Institute of Health and those of the Rockefeller Foundation are dealing with the same agent or virus. It seems likely that many living agents, related and unrelated, will ultimately be

implicated, and these studies will undoubtedly stimulate further research, as did those concerned with the discovery of the viruses of influenza. One may now look forward to the rapid unfolding of many interesting aspects in regard to virus pneumonias.

REFERENCES

- 1 Hornibrook, J W. and Nelson, K R. An institutional outbreak of pneumonitis I Epidemiological and clinical studies *Pub Health Rep* 55:1936 1944, 1940
- Dyer, R E, Topping, N H and Bengtson, I A. An institutional outbreak of pneumonitis II Isolation and identification of causative agent *Ibid* 55:1945 1954, 1940
- 2 Weir, J M and Horsfall, F L, Jr. The recovery from patients with acute pneumonitis of a virus causing pneumonia in the mongoose *J. Exper Med* 72:595 610, 1940
- 3 Derrick, E H "Q" fever, a new fever entity clinical features, diagnosis and laboratory investigation *M J Australia* 2:281 299, 1937
- 4 Burnet, F M and Freeman, M. Experimental studies on the virus of "Q" fever. *M J. Australia* 2 299 305, 1937
- 5 Dyer, R E A filter passing infectious agent isolated from ticks IV. Human infection *Pub Health Rep* 53:2277 2282, 1938
- 6 Stokes, J, Jr., Kenney, A S and Shaw, D R A new filterable agent associated with respiratory infections *Tr & Stud Coll Physicians, Philadelphia* 6:329 333, 1939.

MEDICAL EPONYM

FOWLER'S POSITION

In an article entitled "Results in Diffuse Septic Peritonitis Treated by the Elevated Head and Trunk Position" in *Medical News* (84:1011, 1904), Russell S. Fowler (1848-1906), surgeon to the German Hospital, Brooklyn, New York, describes this position as follows:

Directly after operation the patient is placed in the elevated head and trunk position. This may be done by placing a chair or stool beneath the head-piece of the bed. At the German Hospital, we employ a frame consisting of two side supports and a central bar connecting the two. . . . This frame is secure and allows of different levels being employed. The elevation should never be less than one foot. A folded pillow is placed against the buttocks and through the fold of the pillow is passed a stout bandage which is tied on each side to the head of the bed. This allows the patient to rest comfortably, and maintains his position without exertion on his part.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

PREGNANCY IN A PATIENT WITH PRE-EXISTING, COMPLETE HEART BLOCK

Mrs. L. B., a twenty-eight-year-old primipara, was first seen in the hospital on August 28, 1928,

when approximately two months pregnant, because of threatened miscarriage.

The family history was unknown. The patient's early medical history was noncontributory. It had been known that the patient since the age of twelve years had had a very slow pulse. She had no symptoms referable to the heart, however, until the age of nineteen, when she suddenly fainted while playing field hockey and later was told that she had almost died. In 1925 an electrocardiogram showed complete auriculoventricular dissociation, and a diagnosis of complete heart block was made. Comparatively speaking, the patient was free from any cardiac symptoms. Catamenia began at thirteen, were regular with a twenty-eight-day cycle and lasted three to four days with no discomfort. The last normal period began on June 20, making the expected date of confinement March 27, 1929.

About ten days before she was seen in the hospital the patient had a little bloody discharge. This was followed by a slight amount of staining. Physical examination showed a tall, rather thin woman who looked the picture of health. The physical examination was negative, except for the heart, which was slightly enlarged. The apex was seen and felt in the fifth intercostal space 9.5 cm. from the midsternal line, and the left border of dullness corresponded to the same area. The right border was 3 cm. from the midsternal line, and the supracardiac dullness was 5.5 cm. in width. The cardiac rate was 44 per minute, with slight sinus arrhythmia. The heart sounds were of good quality. The auricular sounds were not discernible. There was a harsh, loud, rather musical systolic murmur heard best at the apex but present all over the precordium. The blood pressure was 110 systolic, 70 diastolic. Vaginal examination showed the cervix in the normal axis, the fundus retroverted.

Once a month during the following weeks of pregnancy the patient returned to the hospital for twenty-four hours. She was examined and weighed. A twenty-four-hour urine analysis was made, and an electrocardiogram and a seven-foot plate of the heart with fluoroscopic examination were obtained at each visit. At no time were there any serious symptoms referable to the heart. The patient gained weight slowly; the blood pressure remained between 120 and 130 systolic, 70 and 80 diastolic. There was a slight increase in the rate of both the ventricles and auricles. Toward the end of December she became somewhat overtired, and complained of palpitation and a sense of constriction in the precordium toward the end of the day. She was advised to rest more, and at her next visit all the cardiac symptoms had disappeared; they did not recur.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

On March 20, 1929, the patient was admitted to the hospital to stay at rest until she went into labor. Examination during this period showed the cervix to be entirely obliterated and very soft; the head was well engaged. She was therefore allowed to go into normal labor, which she did after spontaneous rupture of the membranes at noon on March 31. At 3:00 p.m. she was having unsatisfactory pains and was given subcutaneously 2 minims of Infundin. Labor started satisfactorily and continued until 4:30 p.m., when the pains let up somewhat, and she was again given 2 minims of Infundin. Inhalation of nitrous oxide was started as an analgesic at this time. At 5:30 p.m. the head was in sight, and under ether anesthesia a low-forceps delivery was done.

The child was normal in every way and cried immediately. During labor the patient's pulse reached a maximum rate of 76 and was of good quality; the patient was warm and pink. The cardiac rate dropped to 60 immediately after delivery and to 44 at the time of discharge from the hospital, three weeks after the baby was born.

Examination of the heart one year and eight months after delivery showed the auricular and ventricular rates to be the same as before pregnancy; the size of the heart by x-ray films and by percussion was essentially the same. The heart sounds were of good quality; the loud systolic murmur was still present but had not changed in intensity or type.

Comment. This case was reported in the November, 1931, issue of the *American Journal of Obstetrics and Gynecology*. It is referred to again because of its rarity and in an attempt to show that heart block in itself is a contraindication neither to pregnancy nor to pelvic delivery.

POSTGRADUATE EXTENSION COURSES

The postgraduate extension courses are sponsored by the Massachusetts Medical Society in cooperation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau. Registration is free to all legally registered physicians of the Commonwealth. For further information the district chairman of postgraduate instruction should be consulted.

The programs for the winter sessions are as follows:

MIDDLESEX EAST DISTRICT: MELROSE

SUBJECT	DATE
Recent Advances in Medical Therapeutics: Sedatives; analgesics; cathartics; sulfanilamide compounds; dangerous drugs	January 7

The Clinical Recognition of the Types of Jaundice and Recent Advances in Their Treatment	January 14
Chemotherapy in the Treatment of Gonococcal Infection	January 21
Pediatric Case Discussions	January 28
Diagnosis and Treatment of Minor Lesions of Rectum and Anus	February 4
Technic and Treatment of Primary, Secondary and Tertiary Syphilis	February 11
Obstetric Infections: Diagnosis and treatment	February 18
Head Colds and Complications	February 25
Meetings to be held at the Melrose Hospital, Tuesdays, at 4:15 p.m.	

Walter H. Flanders, M.D., *Chairman*
28 Rowe Street, Melrose

MIDDLESEX SOUTH DISTRICT: CAMBRIDGE

SUBJECT	DATE
Management of Abdominal Distention	January 7
Pediatric Case Discussions	January 14
Technic and Treatment of Primary, Secondary and Tertiary Syphilis	January 21
Diet and Vitamins in Surgery	January 28
Obstetric Complications with Case Histories and Clinical Problems	February 4
Chemotherapy in the Treatment of Gonococcal Infection	February 11
Acute Abdominal Pain: Its interpretation and management	February 18
Recent Advances in Medical Therapeutics: Sedatives; analgesics; cathartics; sulfanilamide compounds; dangerous drugs	February 25
Meetings to be held at the Cambridge Hospital, Mt. Auburn Street, Tuesdays, at 4:00 p.m.	

Dudley Merrill, M.D., *Chairman*
51 Brattle Street, Cambridge

NORFOLK DISTRICT: NORWOOD

SUBJECT	DATE
Obstetric Complications with Case Histories and Clinical Problems	January 9
Dermatitis and Eczema (see below for questions to be discussed)	January 16
Diagnosis and Treatment of Minor Lesions of Rectum and Anus	January 23
Technic and Treatment of Primary, Secondary and Tertiary Syphilis	January 30
Acute Abdominal Pain: Its interpretation and management	February 6
Recent Advances in Medical Therapeutics: Sedatives; analgesics; cathartics; sulfanilamide compounds; dangerous drugs	February 13
Chemotherapy in the Treatment of Gonococcal Infection	February 20
Pediatric Case Discussions	February 27
Meetings to be held at the Norwood Hospital, Thursdays, at 8:30 p.m.	

Hugo B. C. Riemer, M.D., *Chairman*
Norwood. Office: 128 Newbury Street, Boston

NORFOLK SOUTH DISTRICT: QUINCY

SUBJECT	DATE
Chemotherapy in the Treatment of Gonococcal Infection	January 6
Diagnosis and Treatment of Minor Lesions of Rectum and Anus	January 13
Obstetric Infections: Diagnosis and treatment	January 20
Recent Advances in Medical Therapeutics: Sedatives; analgesics; cathartics; sulfanilamide compounds; dangerous drugs	January 27
Dermatitis and Eczema (see below for questions to be discussed) . .	February 3
Pediatric Case Discussions	February 10
Nutritional Deficiencies and the Uses of Preparations of Vitamins . .	February 17
Diagnosis, Treatment and Prognosis of Central-Nervous-System Syphilis. . .	February 24
Meetings to be held at the Quincy City Hospital, Mondays, at 8:30 p.m.	

David L. Belding, M.D., *Chairman*
Hingham. Office: 80 East Concord Street, Boston

SUFFOLK DISTRICT: BOSTON

SUBJECT	DATE
Head Colds and Complications	January 9
Therapeutic Uses of Preparations of Endocrine Glands: Thyroid gland, pituitary gland, ovary, testis and adrenal cortex	January 16
Pediatric Case Discussions .	January 23
Chemotherapy in the Treatment of Gonococcal Infection . .	January 30
Dermatitis and Eczema (see below for questions to be discussed) . .	February 6
Acute Abdominal Pain: Its interpretation and management . .	February 13
Diagnosis, Treatment and Prognosis of Central-Nervous-System Syphilis.	February 20
Obstetric Complications with Case Histories and Clinical Problems . .	February 27

Meetings to be held in John Ware Hall, Boston Medical Library, Thursdays, at 4:30 p.m.

Reginald Fitz, M.D., *Chairman*
319 Longwood Avenue, Boston

The following questions will be discussed in the course on dermatitis and eczema:

- Is there such a thing as eczema?
- Is allergy fact or fiction?
- Are skin tests of value in dermatology?
- Are fungous infections (athlete's foot) as prevalent as we are led to believe?
- With the diagnosis made, what should be the treatment of common cutaneous eruptions?

FACULTY FOR THE EXTENSION COURSES

Dermatology. Chairman: Dr. John G. Downing; instructors: Drs. John Adams, Jr., Leonard E. Anderson,

Bernard Appel, J. Harper Blaisdell, G. Marshall Crawford, Francis P. McCarthy, Mildred L. Ryan, Jacob H. Swartz and Maurice M. Tolman.

Ear, Nose and Throat. Chairman: Dr. LeRoy A. Schall; instructors: Drs. Charles T. Porter, Lyman G. Richards and John R. Richardson.

Gonorrhea. Chairman: Dr. Oscar F. Cox; instructors: Drs. Sylvester B. Kelley and P. N. Papas.

Medicine. Chairmen: Drs. Chester S. Keefer and Robert T. Monroe; instructors: Drs. Fuller Albright, Clifford L. Derick, E. Stanley Emery, Eugene C. Eppinger, Marshall N. Fulton, G. Philip Grabfield, Franz Ingelfinger, Charles A. Janeway, Harold J. Jeghers, William T. Salter, Charles L. Short and Maurice B. Strauss.

Obstetrics. Chairmen: Drs. Meinolf V. Kappius and Roy J. Heffernan; instructors: Drs. Christopher J. Duncan, M. Fletcher Eades, A. Gordon Gauld, Thomas R. Goethals, James C. Janney, Foster S. Kellogg, Joseph W. O'Connor, Louis E. Phaneuf, John Rock, Judson A. Smith and Raymond S. Titus.

Pediatrics. Chairmen: Drs. Warren R. Sisson and James M. Baty; instructors: Drs. Elmer W. Barron, John A. V. Davies, Louis K. Diamond, R. Cannon Eley, Joseph Garland, Harold W. Higgins, Lewis W. Hill, Edwin H. Place and Clement A. Smith.

Surgery. Chairmen: Drs. Howard M. Clute and Leland S. McKittrick; instructors: Drs. Hollis L. Albright, Arthur W. Allen, Franklin G. Balch, Jr., Marshall K. Bartlett, William E. Browne, Richard B. Cattell, Edward A. Edwards, Henry H. Faxon, Jacob Fine, E. Parker Hayden, Thomas H. Lanman, Robert R. Linton, Charles C. Lund, Champ Lyons, Henry C. Marble, E. Everett O'Neil, Neil W. Swinton and Irving J. Walker.

Syphilis. Chairman: Dr. Francis M. Thurmon; instructors: Drs. William P. Boardman, Rudolph Jacoby and C. Guy Lane.

TEACHING CLINICS IN GONORRHEA AND SYPHILIS

The Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health and the United States Public Health Service is again sponsoring teaching clinics in gonorrhea and syphilis. Registration in these teaching clinics is free; all expense of teaching is met by the sponsoring organizations. Clinic schedules are listed below; any legally registered physician in the Commonwealth may attend for one or more days.

Gonorrhea Clinics at the Boston Dispensary. These are open daily from 9:30 to 11:30 a.m., and on Monday, Wednesday and Friday evenings from 6:00 to 8:00. Dr. Oscar F. Cox is in charge. Write or telephone for additional information: Gonorrhea Clinic, Boston Dispensary, Boston.

Syphilis Clinics at the Massachusetts General Hospital. These are held in the Out Patient Department, South Medical Service, on Tuesday and Wednesday from 10:00 a.m. to 12:00 noon. Dr. G. Marshall Crawford is in charge. Write or telephone for additional information: South Medical Service, Massachusetts General Hospital, Boston.

POSTGRADUATE EXTENSION LIBRARY

The Massachusetts Medical Society through the cooperation of the Massachusetts Department of Public Health and the United States Public Health Service plans to provide library extension service in connection with the Society's program of postgraduate education. The funds have been provided by the United States Public Health Service, the Boston Medical Library will be charged with the operation, purchase of books and so forth, and with loaning them to physicians by mail or express.

This library service will be ready in the near future, details will be published in the *Journal*. Lists of references about each course will be available at the postgraduate extension courses. Further information may be obtained by addressing Medical Library Extension Service, 8 Fenway, Boston.

MISCELLANY

NEW TUFTS SCHOLARSHIPS

The Charles Hayden Foundation, through its president, J Willard Hayden, has awarded a grant of \$10,000 to Tufts College Medical School to be used for scholarships for selected members of the entering class in that school next fall.

Following the regular plan of the Charles Hayden Memorial Scholarships in other institutions, a portion of this total will be used for outright scholarships during the first year of medical study. The remainder will be held as a special loan fund to be used in upper-class years by those who hold Hayden scholarships during the first year.

Dr Leonard Carmichael, president of Tufts College, in announcing the gift hailed it as a definite benefit to able and worthy young men who might otherwise be debarred from entering the medical profession. He added that the addition of these scholarships will help further the college's aim of training young men who look forward to careers as modern general practitioners. Since the Tufts College Medical School trains more doctors for New England than any other medical school in the country, President Carmichael stated, the gift will be welcomed by the communities throughout this section, as well as by needy and capable students.

Dr Cadis Phipps will serve as chairman of the committee administering the scholarship grants.

NOTE

On December 16, Dr Frank H Lahey, of Boston, delivered the second Floyd Wilcox McRae Memorial Lecture before the Fulton County Medical Society, of Atlanta, Georgia. The title was 'The Management of Gastric, Duodenal and Jejunal Lesions.'

NOTICES

ANNOUNCEMENT

A H DELMAN, M.D., announces the removal of his office from 479 Beacon Street, to 371 Commonwealth Avenue, Boston.

HARVARD MEDICAL SOCIETY

There will be a meeting of the Harvard Medical Society on Tuesday, January 14, in the amphitheater of the Peter Bent Brigham Hospital at 8 15 p.m. Dr A Rosenbluth will speak on 'A Physiological Analysis of Abnormal Neuromuscular Function.'

SOUTH END MEDICAL CLUB

The next meeting of the South End Medical Club will be held at the headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston, on Tuesday, January 21, at 12 m. Dr George Levene will speak on 'The Relation of Pituitary Function and Mental Development.'

Physicians are cordially invited to attend.

BOSTON DOCTORS
SYMPHONY ORCHESTRA

The Boston Doctors Symphony Orchestra will rehearse under Alexander Thiede, formerly concert master of the Cleveland Symphony Orchestra, every Thursday at 8 30 p.m. Those interested in becoming members should com-

municate with Dr Julius Lomay, Pelham Hall Hotel, Brookline (BEA 2430).

PETER BENT BRIGHAM HOSPITAL

There will be a seminar of the medical staff of the Peter Bent Brigham Hospital on Wednesday, January 8, in the students' laboratory of the hospital at 12 15 p.m.

PROGRAM

Physiologic Changes in Artificial Fever in Relation to Thermal Exchange Dr John G Gibson, 2nd
Discussion of Problems in the Medical Clinic

JOSEPH H PRATT DIAGNOSTIC HOSPITAL

Bennet Street, Boston
Lecture Hall, 9-10 a.m.

MEDICAL CONFERENCE PROGRAM, JANUARY-FEBRUARY

Tuesday, January 7—Public Health in National Defense.

Dr H D Choche

Wednesday, January 8—Hospital case presentation Dr

S J Thannhauser

Thursday, January 9—The History of Pancreatic Diabetes Dr Mirtin Nothmann

Friday, January 10—Renal Disease and Hypertension Dr

W K Leadbetter

Saturday, January 11—Hospital case presentation Dr

S J Thannhauser

Tuesday, January 14—Intestinal Intubation Dr Louis Zetzel

Wednesday, January 15—Hospital case presentation Dr

S J Thannhauser

Thursday, January 16—Chorioepithelioma Dr J T Smith

Friday, January 17—The Present Status of Pneumonia Therapy Dr Maxwell Finland

Saturday, January 18—Hospital case presentation Dr

S J Thannhauser

Tuesday, January 21—Vitamin B Deficiency Dr Stuart Mecklejohn

Wednesday, January 22—Hospital case presentation Dr

S J Thannhauser

Thursday, January 23—Fissure in Ano Dr. E. T. Whitney
 Friday, January 24—Pregnancy Complicating Diabetes Dr. Priscilla White.
 Saturday, January 25—Hospital case presentation. Dr. S. J. Thannhauser.
 Tuesday, January 28—Clinic on Tumors of the Breast Dr. W. M. Shedden.
 Wednesday, January 29—Hospital case presentation. Dr. S. J. Thannhauser.
 Thursday, January 30—Sulfathiazole in Gonococcal Infections. Dr. O. F. Cox.
 Friday, January 31—Clinicopathological conference Drs J. C. Aub and H. E. MacMahon.

*2-4 p.m. Headache Drs E. C. Cutler and J. Romano Peter Bent Brigham Hospital

THURSDAY, JANUARY 9

*8 30 a.m. Combined clinic of the medical, surgical, orthopedic and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital, at the Children's Hospital

*9-10 a.m. The History of Pancreatic Diabetes Dr. Martin Notlmann. Joseph H. Pratt Diagnostic Hospital

FRIDAY, JANUARY 10

*9-10 a.m. Renal Disease and Hypertension Dr. W. K. Leadbetter. Joseph H. Pratt Diagnostic Hospital

SATURDAY, JANUARY 11

*9-10 a.m. Hospital case presentation Dr. S. J. Thannhauser Joseph H. Pratt Diagnostic Hospital

*Open to the medical profession

†Open to the public

FREE PUBLIC LECTURES

Harvard University has recently announced the subjects and speakers in its course of free public lectures on medical topics that are given each year at the Harvard Medical School. As usual these will be given in the amphitheater of Building D at 4:00 p.m. on Sundays. The schedule is as follows:

January 5. The Common Cold and How to Treat It. Dr. William B. Breed.
 January 12. Hormones in Children. Dr. Joseph C. Aub.
 January 19. How Accidents Happen. Dr. Henry C. Marble.
 January 26. Medical Aids to Justice. Dr. Alan R. Moritz.
 February 2. Modern Advances in Surgery. Dr. Oliver W. Cope.
 February 9. Medical Problems Presented by Selective Service. Dr. Frederick F. Russell.
 February 16. The Use and Abuse of Vitamins. Dr. Maurice B. Strauss.
 February 23. Fatigue and Health. Dr. David B. Dill.
 March 2. The Transfusion of Blood and Blood Banks. Dr. Carl W. Walter.
 March 9. The Pathway of Medical Discovery. Dr. Reginald Fitz.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, JANUARY 5

SUNDAY, JANUARY 5

†4 p.m. The Common Cold and How to Treat It. Dr. William B. Breed. Free public lecture. Harvard Medical School, Building D

†4 p.m. The Common Background of Many Symptoms. Dr. Arlie V. Bock. Public health lecture. Cambridge Hospital, Margaret Jewett Hall

MONDAY, JANUARY 6

12 15-1 15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater

TUESDAY, JANUARY 7

*9-10 a.m. Public Health in National Defense. Dr. H. D. Chope. Joseph H. Pratt Diagnostic Hospital

12 15-1 15 p.m. Clinicorontogenological conference. Peter Bent Brigham Hospital amphitheater

8 15 p.m. Some Recent Advances in the Endocrinology of the Female. Dr. Ephraim Shorr. Greater Boston Medical Society. Beth Israel Hospital, Boston

WEDNESDAY, JANUARY 8

*9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital

*12 m. Clinicopathological conference. Children's Hospital

12 15 p.m. Physiologic Changes in Artificial Fever in Relation to Thermal Exchange. Dr. John G. Gibson, 2nd. Peter Bent Brigham Hospital

JANUARY 3—Massachusetts Memorial Hospitals, staff meeting. Page 999, issue of December 12

JANUARY 4—American Board of Obstetrics and Gynecology. Page 787, issue of November 7

JANUARY 5-MARCH 2—Public Health Lectures. Cambridge Hospital. Page 1039, issue of December 19

JANUARY 5-MARCH 9—Free Public Lectures. Harvard Medical School. Notice above

JANUARY 7-31—Joseph H. Pratt Diagnostic Hospital, medical conference program. Notice above

JANUARY 9—Pentucket Association of Physicians. Page 263, issue of August 15

JANUARY 13, 14—Third Annual Congress on Industrial Health. Page 999, issue of December 12

JANUARY 14—Harvard Medical Society. Page 41

JANUARY 21—South End Medical Club. Page 41

FEBRUARY 20-22—American Orthopsychiatric Association, Inc. Page 999, issue of December 12

MARCH 8—American Board of Ophthalmology. Page 201, issue of August 1

MARCH 12-14—New England Hospital Assembly. Hotel Statler, Boston

APRIL 21-25—American College of Physicians. Page 1065, issue of June 20

MAY 21, 22—Massachusetts Medical Society, Boston

JUNE 2-6—American Medical Association. Cleveland, Ohio

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

JANUARY 8—Visceral Pain and Its Relief. Dr. James C. White. Danvers State Hospital, Hathorne

FEBRUARY 5—Gastric and Duodenal Ulcer. Diagnosis and treatment. Dr. Arthur Allen. Lynn Hospital

MARCH 5—Arrhythmia in Heart Disease. Dr. Merrill C. Sosman. Essex Sanatorium, Middleton

APRIL 2—Pediatric Problems in General Practice. Dr. Joseph Garland. Addison Gilbert Hospital, Gloucester

MAY 14—Relation of the Doctor to the Law. Mr. Leland Powers. New Ocean House, Swampscott

FRANKLIN

JANUARY 14

MARCH 11

MAY 13

Meetings will be held at 11 a.m. at the Franklin County Hospital, Greenfield

NORFOLK

JANUARY 28—Carney Hospital

FEBRUARY 25—Medico-legal meeting. 8 30 p.m. Hotel Puritan, Boston

MARCH 25—To be announced

MAY 8—Censors meeting. Hotel Puritan

SUFFOLK

JANUARY 29—Page 604, issue of October 10

APRIL 30—Page 604, issue of October 10

WORCESTER

JANUARY 8—Worcester City Hospital, Worcester

FEBRUARY 12—Worcester State Hospital, Worcester

MARCH 12—Memorial Hospital, Worcester

APRIL 9—Hahnemann Hospital, Worcester

Supper at 6 30 p.m. followed by a business meeting and scientific program

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

Psychotherapy Treatment that attempts to improve the condition of a human being by means of influences that are brought to bear upon his mind By Lewellys F. Barker, M.D., professor of medicine, emeritus, Johns Hopkins University School of Medicine, visiting physician, Johns Hopkins Hospital, Baltimore. 12°, cloth, 218 pp. New York D. Appleton Century Company, Incorporated, 1940 \$2.00

A Surgeon Explains to the Layman By M. Benmosché, M.D. 8°, cloth, 317 pp., with 62 illustrations. New York Simon and Schuster, 1940 \$3.00

Psychiatric Social Work By Louis Meredith French, director, Study of Trends, American Association of Psychiatric Social Workers, and psychiatric social worker and instructor in mental hygiene, New Jersey State Teachers College, Newark. 8°, cloth, 344 pp. New York The Commonwealth Fund, 1940 \$2.25

The 1940 Year Book of Pathology and Immunology, Pathology Edited by Howard T. Karsner, M.D., professor of pathology and director, Institute of Pathology, Western Reserve University, Cleveland. *Immunology* Edited by Sanford B. Hooker, M.D., professor of immunology, Boston University School of Medicine, member, Evans Memorial for Clinical Research and Preventive Medicine, and immunologist, Massachusetts Memorial Hospitals. 12°, cloth, 688 pp., with 113 illustrations. Chicago The Year Book Publishers, Inc., 1940 \$3.00

Compendium Phytaceae By Charles Morton. Compiled about 1680. Vol. xxxiii of the publications of The Colonial Society of Massachusetts. 8°, cloth, 237 pp. Boston The Colonial Society of Massachusetts, 1940 \$5.00

Man's Greatest Victory Over Tuberculosis By J. Arthur Myers, Ph.D., M.D., professor of medicine and preventive medicine and public health, University of Minnesota, and chief of medical staff, Lymanhurst Health Center, Minneapolis. 4°, cloth, 419 pp., with 31 illustrations. Springfield, Illinois Charles C. Thomas, 1940 \$5.00

Multiple Human Births Twins, triplets, quadruplets and quintuplets By Horatio Hackett Newman, Ph.D., Sc.D., professor of zoology, University of Chicago. 8°, cloth, 214 pp., with 24 illustrations. New York, Doubleday, Doran and Company, Incorporated \$2.50

The 1940 Year Book of Industrial and Orthopedic Surgery Edited by Charles F. Painter, M.D., orthopedic surgeon, Massachusetts Women's Hospital and Beth Israel Hospital, Boston. 12°, cloth, 484 pp., with 299 illustrations. Chicago The Year Book Publishers, Incorporated, 1940 \$3.00

The New International Clinics Original contributions, clinics and evaluated reviews of current advances in the medical arts Edited by George Morris Piersol, M.D., professor of medicine, University of Pennsylvania, Philadelphia. Volume IV, New Series 3, 1940. 8°, cloth, 326 pp., with 47 tables and 124 figures. Philadelphia J. B. Lippincott Company, 1940 \$3.00

A Family Doctor's Notebook By I. J. Wolf, M.D., professor of medicine, emeritus, University of Kansas School of Medicine. 8°, cloth, 315 pp. New York Fortuny's, 1940 \$2.00

Blood Pressure Study 1939 4°, cloth, 69 pp. New York compiled and published by The Actuarial Society of America and The Association of Life Insurance Medical Directors, 1940 \$4.00

BOOK REVIEWS

Operative Surgery Volumes I and II, fifth edition. By J. Shelton Horsley, M.D., LL.D., and Isaac A. Bigger, M.D. With contributions by C. C. Coleman, M.D., Austin I. Dodson, M.D., John S. Horsley, Jr., M.D., and Donald M. Faulkner, M.D. 4°, cloth, Volume I, 768 pp., with 802 illustrations, and Volume II, 1567 pp., with 1391 illustrations. St. Louis C. V. Mosby Company, 1940 \$18.00 (set)

The title might lead one to think that this set of two volumes deals only with specific operations. Actually, the word "operative," has been used in its broadest sense, and includes physiology, diagnosis, indications for surgery and many other considerations so essential in obtaining good results.

All the surgical specialties are included, and some of the chapters have been written by authorities in the field. The scope of the work precludes a thorough discussion of some surgical problems, but a good balance is maintained in the editing of all but a few sections. Although the subject has some interest to the surgeon, the space devoted to ligation of arteries seems excessive in view of the relatively infrequent application of this procedure.

The chapters by Dr. Horsley, Sr., deserve special mention. The history, the references to recent contributions and the reasons for a procedure are presented with unusual clarity by this careful student of surgery. His results in complications of acute appendicitis are difficult to improve, and bespeak excellent practical judgment.

These two volumes serve as useful reference for the general surgeon and for the study of surgery in the medical curriculum.

Physical Therapy for Nurses By Richard Kovacs, M.D. Second edition, thoroughly revised. 8°, cloth, 335 pp., with 99 illustrations. Philadelphia Lea & Febiger, 1940 \$3.25

This work is divided into seven parts: an introduction, "Heat," "Sunlight," "Electricity," "Water," "Massage," and "Exercise." These subjects are discussed from the standpoint of physics, physiological effects and technique of application. Although the author has had to be brief, and at times even dogmatic, his method of writing is fortunately such that he has managed to crowd into a small space a great deal of useful information. The tables, diagrams and photographic illustrations of apparatus and technique serve to clarify the text.

Although this book is intended for nurses and technicians who are expected ordinarily to carry out the treatments prescribed by the physician, it gives them, in addition to the technique of application, an insight into the motives or rationale for the employment of these therapeutic measures. It is a praiseworthy contribution to the furtherance of the education of nurses in physical therapy.

The New International Clinics. Original contributions: Clinics and evaluated reviews of current advances in the medical arts. Edited by George Morris Piersol, M.D. Vol. II, New Series 3, 1940. 8°, cloth, 365 pp., with 100 illustrations and 23 tables. Philadelphia: J. B. Lippincott Company, 1940. \$3.00.

This volume is a valuable addition to the series. There are original contributions that deal with varied subjects, among them fungous infections, intermittent claudication associated with sclerotic lesions of the abdominal aorta, theoretical and practical considerations of vitamin K, pelagra therapy and fusospirochetosis.

In clinics by members of the faculty of Rush Medical College and the University of Chicago, the applied physiology of the testis, the glandular treatment of male hypogonadism, malignant giant-cell tumors of the bones and many other interesting subjects are discussed.

The quality of *International Clinics* has long been demonstrated. This volume maintains the high standards of its predecessors.

An Introduction to Biochemistry. By William Robert Fearon, M.A., ScD., M.B., F.I.C. Second edition. 8°, cloth, 475 pp. St. Louis: C. V. Mosby Company, 1940. \$3.75.

In the last few years, a great many texts have appeared on the subject of biochemistry. The author of each has often contributed to different aspects of the problem. Dr. Fearon adds more detail to the subject of chemistry itself and to the chemistry of each of the important component chemical units that take part in biological systems. However, the book is weak in the linking of each of the metabolic processes, and it is extraordinarily brief in discussing the functions of chemical entities. The reader should be warned of numerous mistakes throughout the text. For example, gram instead of milligram has been written in the text, and in the discussion of phosphoflavins, co-carboxylase is discussed instead of co-deaminase. The structural formulas for the sex hormones are erroneous and should be changed. The section on acid-base balance is incomprehensible, because of omission rather than commission. On the whole, the book cannot be recommended as an ideal text for the subject.

Green's Manual of Pathology. Revised and enlarged by H. W. C. Vines, M.A., M.D. Sixteenth edition. 8°, cloth, 1166 pp., with 701 illustrations. Baltimore: Williams & Wilkins Company, 1940. \$8.50.

The sixteenth edition of *Green's Manual of Pathology* is divided into two parts, the first covering the general principles of pathology and the second concerned with the special pathology of organs in relation to clinical medicine. The chapters on bacteriology and parasitology have been omitted. Part I contains new chapters dealing with the process of repair of tissues and with the general character of tumors in the light of recent cancer research. In Part II the chapter on diseases of the blood and diseases of lymphatic tissue and the spleen has been replaced by a chapter on diseases of the reticuloendothelial system, in which the leukemias are included. There is also a chapter on the anemias.

Because pathology is not a static subject but reflects the continuous changes in the knowledge of diseases, factual material is often altered or augmented; an almost endless number of topics demand inclusion. As a textbook on

pathology this volume is very difficult to evaluate because many very important subjects are necessarily omitted.

The arrangement of the various chapters conforms with the standard works in pathology already published in this country. There is an excellent chapter on immunity, allergy and infections, and the one on diseases of the ductless glands is especially informative. The book contains many illustrations, although many show relatively low magnification. Unfortunately, there are no references to the literature, which is a serious omission, since practically all American books on pathology have a voluminous bibliography that is especially useful to the laboratory worker. Except for this omission, the book can be recommended to medical students, because it covers thoroughly the basic facts in the study of pathology.

Psychology and Psychotherapy. By William Brown, D.M. (Oxon.), D.Sc. (Lond.), F.R.C.P. Fourth edition. 8°, cloth, 260 pp. Baltimore: Williams & Wilkins Company, 1940. \$4.75.

The author states in the introductory chapter that he hopes this book "will provide the general reader not only with a grasp of the position and achievements of psychology and psychotherapy today—but also with a psychological basis for the study of politics and international relations." To fulfill this Herculean task, he begins with a presentation of some of the theories of Freud, Jung, Janet, Adler, Morton Prince and others, with the emphasis on Freud's concept of the unconscious and dreams. This portion of the book is followed by theories of the emotions and the author's experience in the treatment of psychoneurotic soldiers in World War I. The chief factors in his management of these cases consisted of persuasion, "whereby the patient was rationally convinced of the true nature of his symptoms," and hypnosis. Seventy per cent of the men returned to the line after an average of a fortnight's rest and treatment in the hospital. In view of such excellent results it is surprising to read later that the author let himself give "mental analysis to the utmost extent" and "suggestion treatment in the most vigorous form" to patients with Korsakow's syndrome due to alcohol. The poor results from psychotherapy in this group of cases were to be expected and might easily have fostered the author's mistaken notion that it is sufficient in a book on psychotherapy to enumerate the psychoses "and pass on, as they give little scope to psychotherapy."

The following are some of the titles of chapters in the latter half of the book: "Sublimation and Spirituality," "Suggestion," "Hypnotism and Faith" and the "Psychology of Peace and War." Here and there these chapters make interesting reading, but they contain little to recommend them to the physician seeking guidance with regard to clinical cases.

Atlas of Cardioroentgenology. By Hugo Roesler, M.D. F°, cloth, 124 pp., with 166 illustrations. Springfield, Illinois: Charles C Thomas, 1940. \$8.50.

This book is more than a good collection of typical x-ray pictures. It is the work of a teacher with a gift for graphic presentation of his material. The x-ray appearances are well correlated with clinical, electrocardiographic and anatomical findings. The printer has achieved remarkably sharp reproductions of the x-ray films. The atlas will not take the place of a comprehensive text or reference book, but it does offer a most lucid introduction to the subject.

The New England Journal of Medicine

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VOLUME 224

JANUARY 9, 1941

NUMBER 2

SULFATHIAZOLE: A CLINICAL AND IN VITRO STUDY OF ITS USE IN INFECTIONS OF THE URINARY TRACT*

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BOSTON

IN the past decade there have been great advances in the treatment of infections of the urinary tract. Before the introduction of sulfanilamide, interest was centered primarily on methenamine and mandelic acid. These urinary antiseptics depended for their action on a certain degree of urinary acidity and the necessary concentration of the bactericidal substance in the urine, but such conditions were difficult to obtain in patients with acute infection, depressed renal function or obstructive lesions of the urinary tract. For these reasons, both drugs were of only limited value. With the introduction of sulfanilamide, reports began to appear concerning its use in urinary-tract infections. It has the advantage of being effective in either an alkaline or an acid urine, provided the concentration is adequate. From the published reports, there is no doubt that sulfanilamide is an effective agent in the treatment of many of these infections.¹⁻⁴ Because certain organisms respond slowly, if at all, to this drug, other chemotherapeutic agents were tested.

Fosbinder and Walter⁵ recently described several thiazole derivatives of sulfanilamide, the most promising of which appears to be sulfathiazole. Several papers⁶⁻⁸ have already appeared concerning in vitro studies of these compounds on organisms commonly associated with urinary-tract infections.

This report deals with the study of 25 patients with infections of the urinary tract due to *Escherichia coli*, *Proteus vulgaris* and *Staphylococcus aureus* who were treated with sulfathiazole; it also discusses comparative studies on the action of various sulfanilamide derivatives on these organ-

isms in vitro. The details of the cases are recorded in Table 1. There were 20 cases of infection due to *Esch. coli*, 3 due to *P. vulgaris* and 2 due to *Staph. aureus*. The primary diagnoses included cystitis, pyelonephritis and perinephritic abscess. The associated lesions included prostatic obstruction, renal stones, megaloureters, pyonephrosis, diabetes mellitus, vesicovaginal fistula, cord bladder and draining cystostomy wounds.

METHOD OF STUDY

To determine the effectiveness of sulfathiazole in the treatment of urinary-tract infections, the following procedures were carried out on each patient. Samples of urine were obtained from women by means of catheterization, and freshly voided specimens were obtained from men. Urine was collected for examination before treatment, two days following the institution of therapy, and at varying intervals thereafter. All cultures of the urine were made within thirty minutes after it was obtained or voided. The organisms were isolated, identified and stored on agar slants. In the specimens of urine containing sulfathiazole, 1 cc. of urine was added immediately to 10 cc. of broth, since the bacteria were soon killed if the urine was allowed to stand. Bacterial counts on urinary sediment were recorded in number of cells per high-power field on both centrifuged and uncentrifuged specimens. The free and total sulfathiazole was determined in the blood and urine after two days' treatment, and at varying periods thereafter. The majority of patients received 2 gm. of sulfathiazole§ by mouth at the beginning of the treatment, followed by 1 gm. every four hours, although some received smaller doses. The total duration of the treatment varied from four to twenty days. The amount of free sulfathiazole

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§Supplied through the courtesy of the Squibb Institute for Medical Research, New York City.

TABLE 1. Summary of Data on All Cases.

CASE NO.	AGE	SEX	DIAGNOSIS	ORGANISM	URINE CULTURES*		URINE SEDIMENT† BEFORE THERAPY	NO OF DAYS TREATED	TOTAL SULFA- THIAZOLE gm.	SULFATHIAZOLE BLOOD		SULFATHIAZOLE URINE‡		REMARKS
					POSITIVE	NEGATIVE				Free mg / 100 cc.	Total mg / 100 cc.	Free mg / 100 cc.	Total mg / 100 cc.	
1	56	F	Acute pyelonephritis and bacteremia	<i>Esch coli</i>	1	3, 8	+	0	31	4.8	5.4	3.64	3.64	Excellent response
2	47	F	Pyelonephritis	<i>Esch coli</i>	1, 3, 8,		++	++	48			1.82	2.08	Failure impacted left ureteral calculus
3	56	F	Acute pyelonephritis and bacteremia	<i>Esch coli</i>	1, 3	8, 9	+++	+	45			1.43	1.46	Excellent response, also had auricular fibrillation with congestive failure
4	27	F	Acute pyelonephritis	<i>Esch coli</i>	1	3, 4, 5, 7	++++	0	37	3.4	3.4	1.77	1.89	Excellent response, mild diabetes mellitus
5	58	M	Acute pyelonephritis and cystitis	<i>Esch coli</i>	1, 3		++	+	20	5.8	8.3	.95	1.30	Failure, improving until fourth day when patient went into shock following a genitourinary procedure — died in 3 hours
6	61	F	Chronic pyelonephritis	<i>Esch coli</i>	1	9, 15, 20	+	+	21	3.5	5.5	1.89	2.45	Improved, temperature never over 99.5°F., mild diabetes mellitus, nausea and vomiting from drug
7	77	F	Subacute pyelonephritis	<i>Esch coli</i>	1	4, 7	++	0	21	5.9	6.4	4.00	4.38	Good response, dysuria and frequency ceased
8	48	F	Chronic pyelonephritis	<i>Esch coli</i>	1	3, 8, 15	+++	0	37	2.8	3.7	2.55	2.92	Good response, febrile reaction to drug on 11th day, urinary symptoms relieved, blood pressure 210/125
9	37	F	Acute pyelonephritis	<i>Esch coli</i>	1, 3, 4, 7, 11, 14		++++	+	33	5.5	7.6	2.14	2.72	Dramatic clinical recovery, febrile drug reaction on 7th day
10	68	F	Acute exacerbation of chronic pyelonephritis	<i>Esch coli</i>	3, 9, 11	5, 20	++++	+	47	4.6	5.1	1.01	1.01	Improved first, good response followed second
11	23	F	Acute pyelonephritis	<i>Esch coli</i>	2, 7, 15		++++	+	49			2.01	2.29	Improved, relapse with febrile and skin reaction to drug on readministration, sulfapyridine and sulfanilamide also tried, severe diabetes mellitus, Good clinical response with symptomatic relief, had prostatic hypertrophy with some obstruction, ungual hernia, aortic aneurysm and cerebral hemorrhage
12	78	M	Cystitis	<i>Esch coli</i>	6	3, 8	++	+	39.5	5.5	7.4	1.93	2.97	Excellent response
13	21	F	Acute pyelonephritis	<i>Esch coli</i>	1, 3	4, 8, 13	++	0	32	4.7	5.1	1.95	2.01	Excellent response
14	35	F	Acute pyelonephritis	<i>Esch coli</i>	1	3, 8	+	0	29	5.2	5.9	4.56	5.32	Excellent response
15	33	F	Acute pyelonephritis	<i>Esch coli</i>	1, 3	3, 6, 8	+	+	40	2.0	2.0	.46	.46	Good clinical response
16	68	M	Acute cystitis	<i>Esch coli</i>	2	4	+++	0	15	0.8	1.0	.38	.73	Good response, postoperative infection
17	48	F	Acute pyelonephritis	<i>Esch coli</i>	1, 3, 8		++++	0	23	0.9	0.9	.50	.63	Good clinical response
18	60	M	Pyelonephritis, left pyonephrosis and cystitis	<i>Esch coli</i>	1, 3	9, 14, 15, 22	++++	+	63	9.7	12.4	2.22	2.38	Improved, large, palpable, non functioning left kidney, urine almost pure pus on entry, had low grade fever
19	40	F	Acute pyelonephritis	<i>Esch coli</i>	1, 4	8, 9	++	+	33	2.7	2.9	1.31	1.51	Good response
20		M	Cystitis	<i>Esch coli</i>	1, 3	6, 8	++++	+++	27	3.0	3.1	2.19	2.41	Improved, prostatic hypertrophy with obstruction necessitating in lying catheter, fever subsided
21	38	M	Perinephritic abscess	<i>Staph aureus</i>	1	3	+	0	40	3.6	3.9	2.88	3.00	Temperature did not fall until perinephritic abscess was drained
22	59	F	Pyonephrosis, megalo-ureters and septic lung infarct	<i>Staph aureus</i>	6	2, 10	++++	++	23.5			3.2	3.2	Sputum culture <i>Staph aureus</i> ; relapse following first course, nausea and vomiting from drug
23	58	M	Pyelocystitis and multiple septic lung infarcts	<i>P vulgaris</i>	1, 23	6, 16			69	5.6	7.2	3.10	4.20	Ruptured suprapubic cystostomy wound, multiple lung abscesses, with <i>P vulgaris</i> in sputum, cultures became negative and fever lower under treatment
24	70	F	Cystitis and vesico vaginal fistula	<i>P vulgaris</i>	1	7	++++	+	10.5					Excellent response, signs of local irritation relieved for first time
25	16	F	Cystitis and cord bladder	<i>P vulgaris</i>	1	2, 4, 9, 11, 15, 19	++++	0	17	7.6	9.0	2.22	2.25	Excellent response, failed on sulfanilamide therapy.

*The numbers indicate the hospital days on which the cultures were taken.

in the blood varied from 0.8 to 9.7 mg. per 100 cc., and the concentration in the urine varied from 32 to 456 mg. per 100 cc.

In vitro studies were carried out, using as culture mediums the urine obtained before therapy and after two days of treatment. After the pH of these two samples had been adjusted to 6.5 or 7.0, they were passed through a Berkefeld filter and stored in an icebox until used. One cubic centimeter of a saline dilution of a twelve-hour broth culture of the organism originally isolated from the same patient was added to 10 cc. of the two samples of urine. The tubes were then incubated at 37°C., pour plates were made from the culture at four, eight, twelve and twenty-four hours, and the colonies were counted. Each experiment was set up so that a small inoculum of 10 to 100 organisms per cubic centimeter and a large inoculum of 1000 to 100,000 organisms per cubic centimeter were used.

RESULTS OF CLINICAL STUDY

Escherichia coli Infections

Of 20 cases of *Esch. coli* infection 13 were cured, 5 were improved, and in 2 the treatment failed to

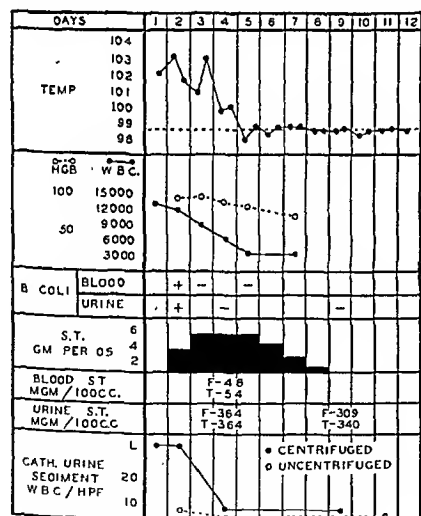


FIGURE 1. Pyelitis, with Bacteremia (Case 1).

influence appreciably the course of the disease. All the uncomplicated cases made a dramatic clinical recovery, with disappearance of symptoms and a fall of temperature to normal within two to four days. In 2 (Cases 9 and 17) the cultures remained positive but relapses did not occur during the ensuing month.

The details of Case 1 are shown in Figure 1; they are illustrative of the response seen in the cases classified as cured. This fifty-six-year-old woman entered with a history of dysuria of three weeks' duration. On admission she had a chill, *Esch. coli* was recovered from the blood and urine, and there was pyuria. The response to sulfathiazole therapy was dramatic, and subjective improvement was noted within twenty-four hours. Figure 2A shows the marked bactericidal effect of this patient's urine, during therapy, for the organism isolated before the onset of treatment. Here 10,000 organisms per cubic centimeter of urine were killed within twenty-four hours, whereas the organisms grew freely in the urine containing no sulfathiazole. This is the type of growth curve obtained for the majority of the patients with *Esch. coli* infections when the urine is studied before and during treatment with sulfathiazole.

The 5 cases classified as improved had the following complications. In Case 6 the patient had diabetes as well as chronic pyelonephritis. Sulfathiazole had to be discontinued after four days because of nausea and vomiting. Although the symptoms of infection were relieved and the urine became sterile, the patient continued to run a low-grade fever. In Case 11 the patient, who also had a severe diabetes, was apparently cured but relapsed after therapy was discontinued, and on readministration of sulfathiazole developed fever and a cutaneous reaction. In Case 20 there was a relapse after five days of treatment but the patient responded promptly to a second course. Initially the patient was probably insufficiently treated. In Case 20 there was a prostatic obstruction and an indwelling catheter was used. The cultures became sterile and fever subsided, but pyuria continued. In Case 18 a sixty-year-old man had a large, palpable, nonfunctioning left kidney; the urine became clear and sterile and dysuria was relieved, but the low-grade fever continued.

Two cases were classified as failures. In one (Case 2) there was a calculus in the left ureter, and under treatment the patient continued to show fever and bacteremia. In the other (Case 5) the patient developed shock and died following a genitourinary procedure.

Proteus vulgaris Infections

There were 3 cases of *P. vulgaris* infection, 2 of which showed an immediate favorable response following the use of the drug (see below). The third (Case 23) was seen following a one-stage prostatectomy; the patient had not only suprapubic drainage of the bladder but also multiple lung abscesses. *P. vulgaris* was isolated in almost pure culture from both the urine and the sputum.

While the patient was receiving sulfathiazole, the urine cultures became negative and there was clinical improvement. The drug treatment was discontinued when the patient left our care, and *P. vulgaris* promptly reappeared in the urine draining from the suprapubic wound.

Figure 3 illustrates the clinical course of a sixteen-year-old girl (Case 25) who was seen at the Evans Memorial Hospital. On entry she was found to have an atonic bladder, flaccid paralysis of the left

after treatment was started. Here, with an original inoculum even as large as 100,000 organisms per cubic centimeter there was marked bacteriostasis. The concentration of free sulfathiazole was 222 mg. per 100 cc. of urine.

The other patient (Case 24), whose case was especially interesting because of a long history of infection and recovery after small doses of sulfathiazole, was followed through the courtesy of Dr. Maurice Strauss. She was seventy years old, and

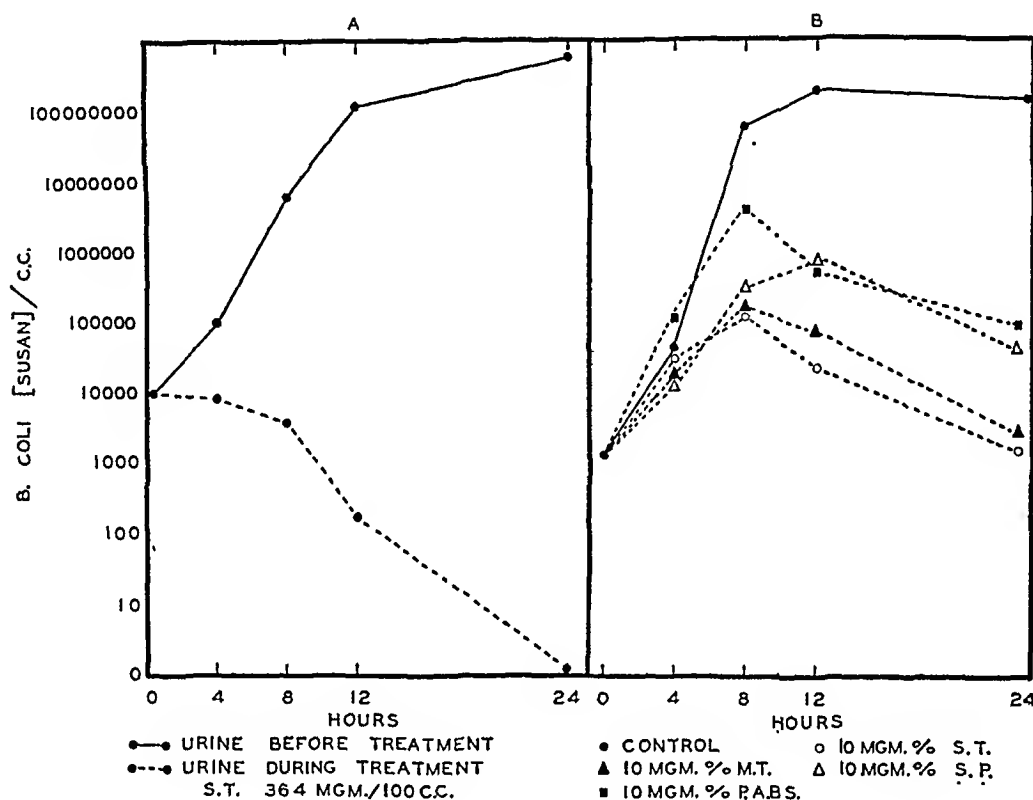


FIGURE 2. Growth Curve of *Escherichia* (*Bacillus*) *coli* in Urine (Case 1).

S.T. = sulfathiazole; M.T. = sulfamethylthiazole; S.P. = sulfapyridine; P.A.B.S. = sulfanilamide.

arm and leg, flaccid paresis of the right leg and a left-sided Horner's syndrome. An etiologic diagnosis could not be definitely established, but there was thought to be a widespread vascular lesion of the spinal cord. The patient was placed on tidal drainage of the bladder for forty-four days, after which she regained normal function of the bladder. She had some dysuria and occasional bouts of low-grade fever. Eleven specimens of urine were positive for *P. vulgaris* and contained many leukocytes. She was given two courses of sulfanilamide, without apparent benefit. Two days after the beginning of sulfathiazole therapy the urine was sterilized, and it remained sterile. Figure 4 A demonstrates the results of the in vitro action of this patient's urine collected before and two days

had a vesicovaginal fistula, and a *P. vulgaris* infection of the bladder of six months' duration. The symptoms were due to spasm and local irritation of the bladder. She was given 0.5 gm. three times daily. Examination at the end of seven days showed that all local signs of irritation had disappeared and that symptoms were relieved for the first time in many months. The urine culture became negative for *P. vulgaris*.

Staphylococcus aureus Infections

Two cases of *Staph. aureus* infection of the urinary tract were treated. In Case 21 the urine became sterile under therapy; the fever persisted, however, and the patient developed signs of perinephritic abscess. Drainage at operation was fol-

lowed by complete recovery. The course was uninfluenced in Case 22. As can be seen from the table, the patient had pyonephrosis, megaloureters and a lung abscess. Both cases demonstrate the fact that if response to drug therapy is not obtained some complicating factor is usually present. That the urine becomes bactericidal is clearly dem

shows a typical example of one of the growth curves. In both the control and the drug-containing tubes there was an initial growth period of about four hours, following which the effect of the various drugs became manifest. The urine containing sulfanilamide showed moderate bacteriostasis, but that containing sulfapyridine showed it to a more

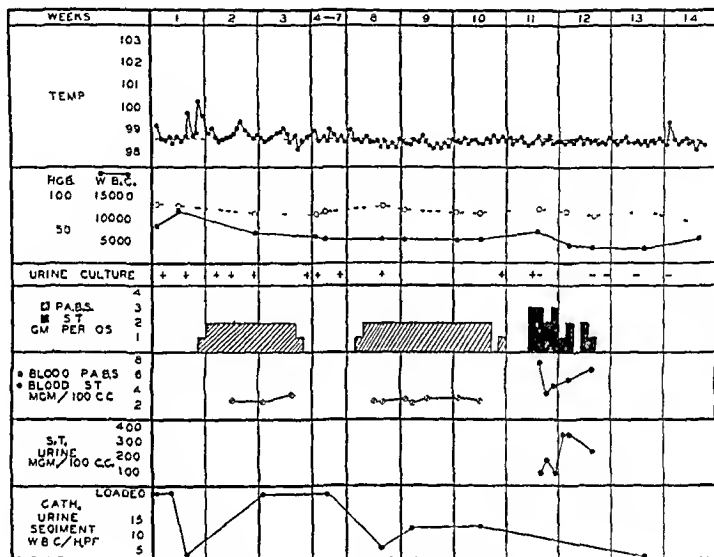


FIGURE 3 Cystitis Due to *Proteus vulgaris* (Case 25)

onstrated in Figure 5A (Case 21). The urine showed complete sterilization at the end of twenty four hours' incubation.

COMPARATIVE STUDY OF SULFANILAMIDE DERIVATIVES IN URINE

To justify a report on the use of a new drug, namely, sulfathiazole, it was believed that a comparative study of the sulfanilamide derivatives in vitro was necessary. The experiments reported here were all done on the same sample of urine, which had been adjusted to a pH of 7.0. Sulfanilamide, sulfapyridine, sulfamethylthiazole* and sulfathiazole were added, so that the final concentration was 10 mg per 100 cc. Growth curves were then determined following a technic similar to that described above.

Various strains of *Esch. coli* that had recently been isolated from patients with urinary tract infections were used in these experiments. Figure 6A

marked degree. Urines containing sulfathiazole and sulfamethylthiazole both exhibited bactericidal as well as bacteriostatic action. Usually sulfathiazole was a little more effective than sulfamethylthiazole, however, the difference was not striking.

Occasionally some strains of *Esch. coli* appeared to be somewhat more resistant to the action of these drugs. Figure 2B is an example. Here, although the original inoculum was larger than that in Figure 6A, the action was not so marked as that generally observed. However, urine containing sulfathiazole again showed the most marked bacteriostasis. Not infrequently, *Aerobacter aerogenes* is found to be the infecting organism in urinary tract infections. Figure 6B shows the comparative action of the drugs on this organism, which had recently been isolated from the blood stream of a patient with urinary tract infection. In this experiment the action of sulfathiazole was striking.

Sulfanilamide therapy in *P. vulgaris* infections of

*Supplied through the courtesy of the Winthrop Chemical Company, New York City.

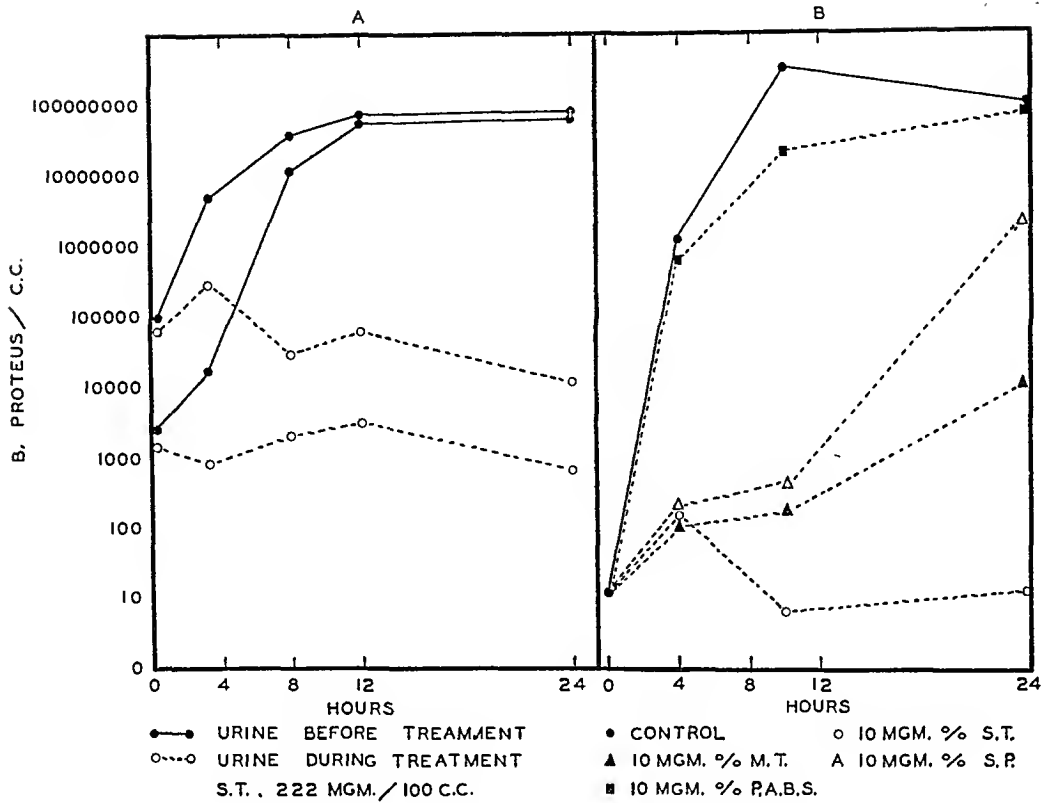


FIGURE 4. Growth Curve of *Proteus vulgaris* (B. proteus) in Urine (Case 25).

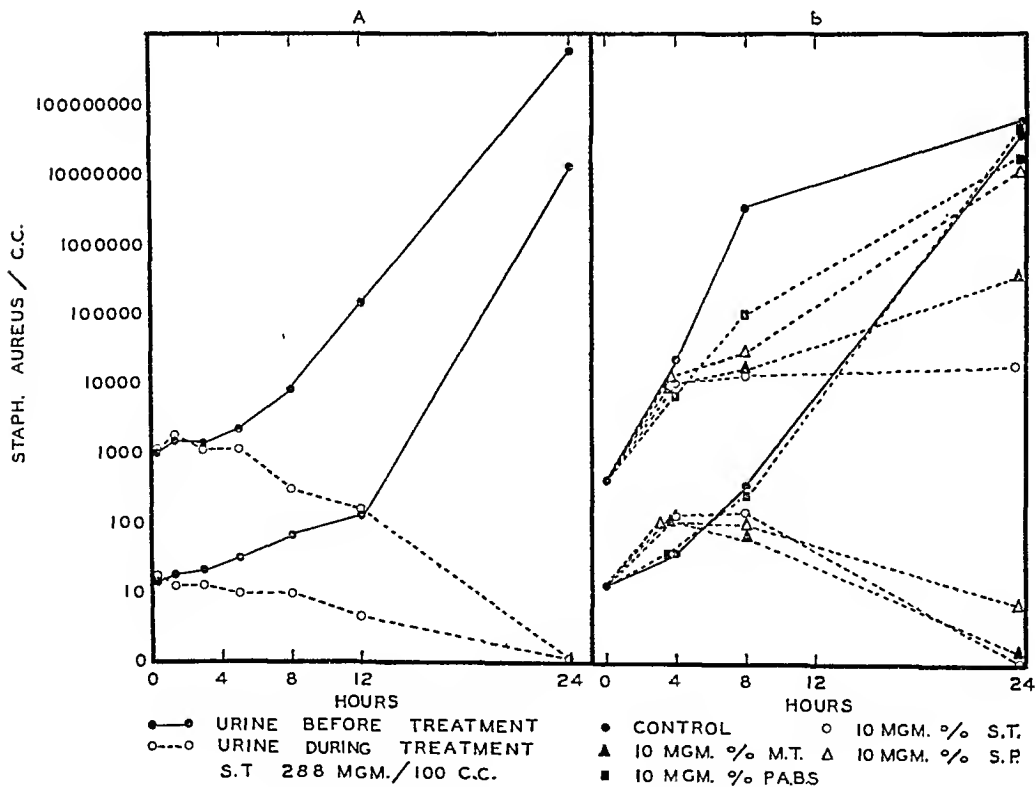


FIGURE 5. Growth Curve of *Staphylococcus aureus* in Urine (Case 21).

the urinary tract has been somewhat disappointing, and the results of a comparative study of the activity of the drugs against this organism are therefore especially interesting. Long and Bliss⁷ reported some inhibition of growth in broth cultures containing 10 mg. per 100 cc. Figure 4 B is an example of the action of sulfathiazole on *P. vulgaris* in urine. When large inoculums were used all tubes showed growth, but some bacteriostatic action could be demonstrated in those con-

and sulfamethylthiazole. With a larger inoculum there was bacteriostasis without complete sterilization at the end of twenty-four hours' incubation. Sulfathiazole appeared to be the most effective of the four drugs used against *Staph. aureus*.

DISCUSSION

Sulfathiazole therapy for urinary-tract infections due to *Esch. coli* and *P. vulgaris* has given encouraging results. In this clinical study it has been

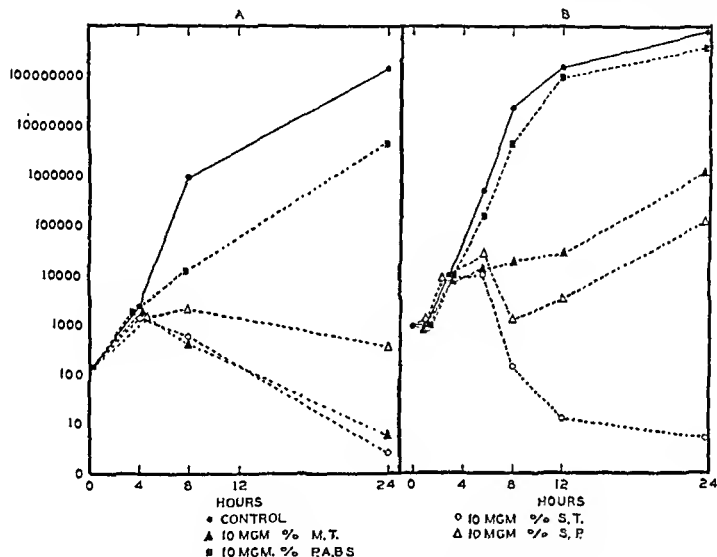


FIGURE 6. Growth Curves of *Escherichia coli* (A) and *Aerobacter aerogenes* (B) in Urine.

taining sulfathiazole. Sulfanilamide in this experiment, as well as in others not here reported, had little demonstrable effect. Sulfapyridine appeared to be more effective than sulfanilamide, and sulfathiazole and sulfamethylthiazole the most active of all.

Sulfanilamide and sulfapyridine have been disappointing in the treatment of all staphylococcal infections. Therefore, a drug that is effective against this organism would indeed be most useful. Rammelkamp and Keefer⁹ have shown that in whole defibrinated blood sulfathiazole is an effective bactericidal and bacteriostatic agent, even more so than sulfamethylthiazole, sulfapyridine or sulfanilamide. This was also found to be true when urine was used as the medium (Fig. 5 B). When a small inoculum was used there was complete sterilization of the urine containing sulfathiazole

demonstrated that usually the urine not only becomes sterile and free of leukocytes, but also exhibits definite bacteriostatic and bactericidal action against twenty strains of *Esch. coli*, three strains of *P. vulgaris* and two strains of *Staph. aureus*.

This bacteriostatic and bactericidal action of sulfathiazole was demonstrated in urine containing between 32 and 456 mg. of free sulfathiazole per 100 cc. A favorable response was obtained in three patients (Cases 15, 16 and 17) with a concentration of less than 50 mg. per 100 cc. It appears from these clinical studies and also from studies in vitro that a concentration of between 50 and 200 mg. per 100 cc. of free sulfathiazole is sufficient to sterilize the urine. It is necessary to give 2 to 4 gm. of sulfathiazole in divided doses daily to obtain such concentrations. Restriction of fluid is not neces-

sary. In severe infections, especially those associated with stasis of urine, a concentration of sulfathiazole between 200 and 450 mg. is needed. This amount of the drug in the urine may be obtained by giving 4 to 6 gm. in divided doses daily.

No severe toxic manifestations were encountered in these cases. Nausea and vomiting occurred in two cases, and there were febrile reactions in 3, one accompanied by a cutaneous eruption. The bloods and urines were followed closely, but no evidence of toxic effects was noted.

It is interesting that complicating factors, such as diabetes mellitus, prostatic obstruction, pyonephrosis and nausea and vomiting, were present in the patients not promptly cured. Close analysis shows that some improvement took place under drug therapy, and this treatment seems valuable even in these cases.

In vitro studies on the action of the various sulfonamide compounds in concentrations of 10 mg. per 100 cc. showed that sulfathiazole had the most marked bacteriostatic and bactericidal action. Several experiments with higher concentrations of the drugs showed sulfathiazole to be more effective, even at these concentrations.

CONCLUSIONS

Sulfathiazole was used in the treatment of 25 cases of urinary-tract infections, and it was shown

to be effective against *Escherichia coli*, *Proteus vulgaris* and *Staphylococcus aureus* infections.

The urine of patients receiving sulfathiazole exhibited marked bactericidal and bacteriostatic action in vitro.

Comparative studies of the action of sulfathiazole, sulfamethylthiazole, sulfapyridine and sulfanilamide in urine containing 10 mg. per 100 cc. showed that sulfathiazole is the most effective bactericidal and bacteriostatic agent against *Esch. coli*, *Aerobacter aerogenes*, *P. vulgaris* and *Staph. aureus*.

Sulfathiazole deserves further clinical trial in the treatment of urinary-tract infections.

REFERENCES

1. Rantz, L. A. and Keefer, C. S. Sulfanilamide in treatment of infections of the urinary tract due to *Bacillus coli*. *Arch. Int. Med.* 65:933-956, 1940.
2. Helmholz, H. F. The use of sulfanilamide as a urinary antiseptic. *J. Pediat.* 11:243-247, 1937.
3. Mitchell, D. R., Greey, P. H. and Lucas, C. C. Sulphanilamide in the treatment of cystitis and pyelitis. *Canad. M. A. J.* 40:336-342, 1939.
4. Kenny, M., Johnston, F. D., von Haebler, T. and Miles, A. A. *p*-Aminobenzenesulphonamide in treatment of *Bacterium coli* infections of the urinary tract with a note on 2-plate bacterial count. *Lancet* 2:119-125, 1937.
5. Fosbinder, R. J. and Walter, L. A. Sulfanilamide derivatives of heterocyclic amines. *J. Am. Chem. Soc.* 61:2032, 1939.
6. Helmholz, H. F. The bactericidal effect of sulfathiazole and sulfamethylthiazole in bacteria found in urinary infections. *Proc. Staff Meet., Mayo Clin.* 15:65-68, 1940.
7. Long, P. H. and Bliss, E. H. Bacteriostatic effects of sulfathiazole upon various micro organisms. Its therapeutic effects in experimental pneumococcal infections. *Proc. Soc. Exper. Biol. & Med.* 43:324-327, 1940.
8. Hill, J. N. The comparative in vitro action of sulfanilamide, sulfapyridine and sulfathiazole in urine. *J. Urol.* 43:491-495, 1940.
9. Rammelkamp, C. H. and Keefer, C. S. Sulfathiazole effect on *Staphylococcus aureus* in vitro. *Proc. Soc. Exper. Biol. & Med.* 43:664-668, 1940.

FAMILIAL HEMOLYTIC CRISIS*

Report of Three Cases Occurring Within Ten Days

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WITHIN a period of ten days, three children in the same household—two brothers and a cousin—became successively ill and were admitted to the Waltham Hospital for treatment. Each child was found to be suffering from a severe hemolytic crisis, and splenectomies were performed on all three. The first child died, but the other two made uneventful recoveries. This report is presented because hemolytic crises occurring successively at short intervals in members of the same family are rare, and because the management of these cases is of the utmost importance.

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CASE REPORTS

FAMILY BACKGROUND. The patients, D. C. M., 2nd, R. M., Jr., and M. McN., were grandchildren of D. C. M. aged 70, a known case of congenital hemolytic icterus, who considered himself to be in good health, was able to do his daily work as a carpenter and had no symptoms. He had never been anemic and had never been subject to sudden attacks of icterus. Examination revealed slight icterus and a large spleen extending three fingerbreadths below the left costal margin. Examination of the blood (Table 1) showed no definite anemia, although reticulocytosis, spherocytosis and increased hypotonic fragility were present. His son, R. M., aged 41, the father of D. C., 2nd, and of R. M., Jr., had been jaundiced since childhood. He was troubled with lack of "pep," occasional spells of vomiting and sporadic attacks of marked jaundice. Examination revealed moderate icterus and an enlarged spleen felt four fingerbreadths below the left costal mar-

gin Examination of the blood (Table 1) showed high hemoglobin levels and no anemia, although reticulocytosis, spherocytosis and increased hypotonic fragility were present. R M had three brothers and a sister. One brother had tuberculosis, the others were well. One sister, who died at 26 of miliary tuberculosis, had been jaundiced for years. Her only child, M McN, lived with the R M family, having been adopted by them. There were prob-

margin Examination of the blood showed a red-cell count of 1,250,000, with 36 per cent hemoglobin (Sghli), and a white-cell count of 3800. The red cells showed an extreme degree of spherocytosis, and the average red cell diameter was 5.63 microns. On April 16, the patient's condition was critical, the red cell count having dropped to 1,010,000. An emergency splenectomy was decided on just prior to operation the patient was given 1000 cc of

TABLE 1 Data on D C M and R M

	HEMOGLOBIN %	RED-CELL COUNT × 10 ⁶	WHITE-CELL COUNT × 10 ³	PLATELET COUNT × 10 ³	RETICULO- CYTES %	MEAN CORP VOLUME cu microns	MEAN CORP DIAMETER microns	MEAN CORP THICKNESS microns	FRAGILITY % NaCl	SERUM BILI- RUBIN mg/100 cc
D C M	85	434	70	269	19	90	6.57	2.7	0.60 0.16 0.65 0.22	3.8
R M	97	453	103	410	2.2	90	6.77	2.5	0.68 0.20 0.80 0.04	4.2
	110	532	140	1500	14.2	83	6.0	2.4		

ably other cases of hemolytic icterus in the family, which was a large one, but this could not be verified.

CASE 1 D C M, 2nd, an 11 year-old boy, had been known to have jaundice, anemia and splenomegaly for years. About three times a year he developed slight attacks of fever, weakness, pallor and increased icterus, but the attacks were always mild and cleared up after a few days' rest at home. On April 13, 1938, he complained of dizziness and pain in the midabdomen and vomited several times. He became rapidly worse on April 14, when

normal salt solution and 500 cc of citrated blood. The operation was performed by Dr. H. Quimby Gallupe with out incident. During the operation 600 cc of blood was given slowly intravenously. In all, 2100 cc of fluid was given intravenously within 90 minutes. At the end of the operation the patient began to pass large quantities of frothy sputum. All attempts at resuscitation failed, and the patient shortly expired, apparently of pulmonary edema. Permission for autopsy was refused.

CASE 2 R M, Jr, a 12 year-old boy, like his brother

TABLE 2 Data on R M, Jr

DATE	HEMOGLOBIN %	RED CELL COUNT × 10 ⁶	WHITE CELL COUNT × 10 ³	PLATELET COUNT × 10 ³	RETICULO- CYTES %	MEAN CORP VOLUME cu microns	MEAN CORP DIAMETER microns	MEAN CORP THICKNESS microns	FRAGILITY % NaCl	SERUM BILI- RUBIN mg/100 cc
4-22-38	30	1.22	30		0.4		6.23		0.64 0.34	5.1
4-23										
1 a.m.										
4 a.m.										
8 a.m.	47	2.54	3.6							
10 a.m.										
12 m.	69	3.66			0.6					
3 p.m.	70	3.33								
4-24										
9 a.m.	68	2.56								
11 a.m.										
1 p.m.										
4-25	93	5.47			0.3					
4-26	89	4.67								
5-6	98	4.64								
5-17	80	3.72	8.3	538	1.3					
6-14	89	4.61		1209	1.6					
7-12	92	4.56		820	0.2				0.56 0.27	
8-16	99	4.88		1220	1.0					
10-18	102	5.06	3	1113	1.2	84	6.7	2.3	0.52 0.26 0.60 0.04	
2-20-39	95	4.83	8.4	740	0.2					
4-17-40	93	4.78	8.9	1061	1.4	90	6.3	2.9	0.56 0.12	0.9

well marked jaundice and pallor were noted. The next day his condition seemed desperate and he was admitted to the Waltham Hospital by Dr. Frank J. Fleming, to whom I am indebted for the privilege of seeing these cases.

Physical examination revealed a small, rather under developed boy lying quietly in bed. He appeared acutely ill, had the appearance of mild shock, and showed well marked pallor, with a lemon yellow discoloration of the skin and sclera. The temperature ranged between 101 and 103.5°F, and the pulse rate between 120 and 140. A soft systolic murmur was heard at the apex. The spleen was palpable three fingerbreadths below the left costal

(Case 1), had been known to have hemolytic icterus for years. Several times annually he had mild attacks of fever and malaise, during which an increase in pallor and jaundice was always noted. The present attack, which was much severer than any previous one, began on April 21, 1938, or 8 days after the onset of his brother's crisis. It was characterized by fever, malaise, headache and left sided abdominal pain. The next day there was marked dizziness and weakness, and the patient was admitted to the Waltham Hospital.

Physical examination revealed an acutely ill child, somewhat small for his age, with extreme pallor and slight

jaundice. The temperature was 103.6°F., the pulse 120, and the blood pressure 104/60. The heart was not enlarged, but a rather loud, blowing systolic murmur was heard over the precordium. A large, somewhat tender spleen was felt three fingerbreadths below the left costal margin. Examination of the blood showed a marked anemia: a red-cell count of 1,220,000, with 30 per cent hemoglobin (Sahli), and an associated leukopenia (Table 2). There was extreme spherocytosis of the red cells, and the hypotonic fragility test showed beginning hemolysis at 0.64 per cent of sodium chloride solution, complete at 0.34 per cent. Because of the fatal result in Case 1, it was decided to give several transfusions prior to splenectomy, but spaced at intervals of at least 3 hours. Transfusions of citrated blood of 400 or 500 cc. each were accordingly given at 1, 4 and 10 a.m., April 23, with the result that at 3 p.m. the hemoglobin had risen to 70 per cent and the erythrocyte count to 3,330,000. On the

malaise and fever. The next day the patient complained of lower abdominal pain and headache, and on April 24 she was admitted to the Waltham Hospital.

Physical examination revealed a very delicate-looking, acutely ill child with marked pallor and slight icterus. The temperature was 103°F. and the pulse 120. The splenic edge was felt one fingerbreadth below the left costal margin. Examination of the blood showed a red-cell count of 1,700,000, with 35 per cent hemoglobin, and a white-cell count of 5000 (Table 3). There was marked spherocytosis, and the hypotonic fragility test showed beginning hemolysis at 0.80 per cent, with complete hemolysis at 0.56 per cent. Because the patient did not appear so severely ill as her cousins, it was decided to temporize for a day or two. During this period swine serum, prepared by the method recommended by Josephs,¹ was given in increasing dosage for its possible antihemolytic effect. However, by April 26 there was a slight though

TABLE 3. *Data on M. McN.*

DATE	HEMO- GLOBIN %	RED-CELL COUNT × 10 ⁵	WHITE-CELL COUNT × 10 ³	PLATELET COUNT × 10 ³	RETICULO- CYTES %	MEAN CORP. VOLUME cu. microns	MEAN CORP. DIAMETER microns	MEAN CORP. THICKNESS microns	FRAGILITY % NaCl	SERUM BILI- RUBIN mg./100 cc.
4-24-38	35	1.70	5.0						0.80-0.56	
4-25 a.m.	35	1.98	5.6		0.7					
p.m.	31	1.83	5.0							
4-26	30	1.62			0.6				0.62-0.50	
Transfusion (300 cc.)										
4-27										
Transfusion (300 cc.)										
	38	2.25					5.81			
Splenectomy										
4-28	65	4.11	21.0		0.6					
4-29	69	4.04	17.0		0.3					
4-30	70	4.02			0.3					
5-2	78	4.60			0.3					
5-3	89	4.89			0.2					
5-4	93	4.57			0.4					
5-17	71	3.96			0.2					
6-21	80	4.12	13.6						0.60-0.16	
7-12	78	4.27								
9-13	84	4.57	9.5	1,540	2.3	88	7.0	2.3		
2-20-39	90	4.42		1,560		89			0.68-0.16	
4-17-40	89	4.46	7.4	1,471	3.7	84	6.12	2.8	0.64-0.22	1.07

morning of April 24 the patient looked considerably better, and there was a definite diminution in both the temperature and the pulse rate. However, the hemolytic process was apparently still quite active, as indicated by a drop in the erythrocyte count to 2,560,000 in 15 hours. Splenectomy was performed by Dr. Gallupe under nitrous oxide, oxygen and ether anesthesia, and 2 hours later another transfusion of 500 cc. of citrated blood was given. Sections of the spleen showed marked congestion of the pulp. On the following day, dramatic rises in both hemoglobin and red-cell count were evident. Convalescence was uneventful, the temperature and pulse becoming normal by lysis in 8 days. No further transfusions were necessary. At discharge from the hospital on May 6 the hemoglobin was 98 per cent and the red-cell count 4,640,000 (Table 2). The patient has since been entirely well and has shown a striking increase in weight and stature.

CASE 3. M. McN., a 5-year-old girl and the cousin of the two boys (Cases 1 and 2), had also been known to have hemolytic jaundice and had had several attacks of hemolytic crisis. The present attack began on April 22, 1938, the day after the onset in Case 2. There was at first

definite drop in both the hemoglobin level and the red-cell count. Transfusions of citrated blood in 300-cc. amounts were accordingly given on April 26 and 27, and a splenectomy was performed on the latter date by Dr. Gallupe. The spleen weighed 350 gm., and microscopic sections showed marked congestion of the pulp. Convalescence was uneventful. On May 4, the day of discharge, the red-blood cell count was 4,570,000 with 93 per cent hemoglobin, and the white-cell count 10,200. In the course of the next several months there was a definite increase in the diameter of the red cells and a great diminution in spherocytosis but a persistence of abnormal fragility. In April, 1940, spherocytosis was again definitely increased.

DISCUSSION

The Hemolytic Crisis

Congenital hemolytic jaundice is a chronic hereditary disease subject to more or less frequent and violent fluctuations in the degree of anemia and icterus, known as hemolytic crises. Most authorities²⁻⁴ consider the disease to be a hereditary dis-

order of red-cell formation in the bone marrow, with the production of small thick erythrocytes (spherocytes) as the salient feature:

The hemolytic crisis is difficult to explain on the basis of a congenital disturbance in blood formation. Its outstanding feature is the great increase in spherocytosis and blood destruction, features that closely resemble the sudden development of unusual hemolysis through the action of various toxic, chemical or immunologic substances. Dameshek and Schwartz⁵ showed that all the features of the hemolytic crisis, including the marked spherocytosis and increased fragility, could be imitated in the experimental animal by the injection of hemolytic heterophilic serum. These data indicated that spherocytosis is not necessarily of hereditary origin but may be induced by hemolysins of various types. Furthermore, a group of cases of acquired hemolytic icterus was observed in some of which hemolysins were found in the serum and in which spherocytosis and increased fragility were temporarily present.^{6,7} These cases, which indicated the close relation between the presence of hemolysins, hemolytic anemia and spherocytosis, also established from the clinical standpoint that spherocytosis was not necessarily of congenital origin. The concept was therefore advanced that hemolytic anemia or icterus was caused, not by an intrinsic defect of the marrow, but rather by the action of hemolysins of various types and in varying "doses" on mature red blood cells. Both the crisis of chronic congenital hemolytic jaundice and the sudden appearance of acute hemolytic anemia in a previously healthy person might be explained by a sudden increase in circulating hemolysins (arising from the spleen?), with the resultant development in the mature red cells of spherocytosis and increased fragility. The occurrence of hemolytic crisis in three members of the same household within a period of ten days might be further evidence in favor of an extrinsic rather than an intrinsic cause of the crisis.

The nature of the possible extrinsic cause in the reported cases was not determined. The possibility of an infectious process was thoroughly investigated. None of the children showed any evidence of an infection, although this does not exclude such a possibility. The fever present in each case is common to all severe hemolytic processes, and is therefore not necessarily infectious in origin. There was no evidence of an infectious process in any of the immediate family, nor was there any unusual incidence of "grippe" or some similar condition in the neighborhood. Except for their greater severity the crises were closely similar to previous ones, which, according to the mother, always oc-

curred in the spring or fall. The possibility that the children might be allergic to grasses or ragweed was thereupon investigated, but negative results were obtained. The grounds about the house were searched for plants such as the fava bean, but none were found. No unusual foods had been eaten.

In each case, the blood serum and the splenic-vein blood (at splenectomy) were examined for iso-hemolysins, according to the technic described by Dameshek and Schwartz.⁵ None were found, and no unusual agglutinins of either the so-called "cold" or "auto" type were discovered. Severe transfusion reactions did not occur, and no hemolytic or agglutination reactions were observed in cross-matching the patient's blood serum with various donor red cells.

The only comparable group of cases of hemolytic crisis in the literature is that of Dedichen,⁸ reported in 1937. Under the title of "Holla Disease": Epidemic appearance of anemic crisis in hemolytic icterus," this author reported a strange disease that had successively attacked most of the members of two families living in or near Holla, Norway. In the first family (H.), 4 of the 7 children had been taken ill in November, 1933, with fever, vomiting, pallor and enlargement of the spleen. Nine members of the second family (S.), including the father, successively developed acute hemolytic crises in February and March, 1934. The dates of onset were February 22 and March 1, 6, 8, 10, 14, 17, 19 and 22. The hemoglobin readings varied from 20 to 40 per cent, and the hypotonic fragility was greatly increased in all. There were 2 deaths, one in a nine-year-old child (untreated) and the other in a twenty-year-old girl, apparently because of a transfusion reaction (incorrect typing?). Three patients recovered spontaneously, and 4 recovered after one or two transfusions. The typical features of congenital hemolytic jaundice persisted in all the cases, although the splenic size greatly diminished.

Dedichen believed that the hemolytic crises were probably induced by an infection of the "grippal" type, because one of the children of the S. family, not afflicted with the disease congenital hemolytic icterus, fell ill with typical "grippe" during the same period and did not develop anemia or splenomegaly. This opinion seems logical, especially in view of the large number of persons affected and the successive development of the crises within two to seven days of each other. Blood cultures and tests for serum hemolysins were not performed.

The reduction in leukocytes, thrombocytes and reticulocytes in the cases reported here appears at

first glance somewhat unusual, since in the presence of an acute hemolytic process one would expect to find the evidences of increased regenerative activity on the part of the bone-marrow, that is, leukocytosis, thrombocytosis and reticulocytosis. The lack of these features might conceivably be due to unusual splenic activity. The spleen and the bone marrow may be said to have an antagonistic or reciprocal relation. One may speculate as to whether this relation is due to a hormonal influence of the spleen on the marrow, with the result that the maturation or delivery of cells to the circulation becomes inhibited. In sudden splenic hyperactivity, which Heilmeyer⁹ believes is at the basis of the hemolytic crisis, it is possible that the bone marrow may become inhibited, with resultant leukopenia, thrombocytopenia and reticulocytopenia. It is also possible that an obscure ("grippal" or influenzal) infection might somehow activate the spleen in these cases, with the resultant development of a hemolytic crisis.

Treatment of Hemolytic Crisis

From the experience gained both in these and in other cases, it appears that although emergency splenectomy as a therapeutic procedure is occasionally necessitated (Doan et al.¹⁰), the importance of placing the patient in proper condition for the operation is of primary concern. For the patient in apparent shock with fever and profound anemia, it is essential to replace fluids, electrolytes and blood. This may best be done by transfusions, preferably given slowly and at intervals sufficiently spaced to prevent undue strain on the circulation and the right side of the heart. Two to four transfusions of 500 cc. for an adult, or of 250 to 300 cc. for a child, given at three-hour to six-hour intervals are generally sufficient to obtain a quieter, healthier, less anemic patient, with a circulation that is better able to withstand the strain of splenectomy. The sudden introduction into the circulation of large quantities of fluids and blood preliminary to immediate operation (Case 1) may be distinctly harmful. It is therefore recommended that the immediate emergency be combated by transfusions properly spaced, with or without added parenteral fluids, to be followed by splenectomy within twelve to forty-eight hours, when the patient is relatively afebrile, less anemic and with a slower pulse.

Each hemolytic crisis undoubtedly puts a severe strain on the circulation and is usually followed by a prolonged convalescence. Children having frequent crises are generally underdeveloped. The

possibility is present, too, that a crisis may be so fulminating as to result in death or in the necessity for an emergency splenectomy. In a very severe crisis, as in the present cases, the operation of splenectomy is probably best not set aside, since the hemolytic tendency may continue to manifest itself as soon as the effects of transfusions have worn off. For these reasons, any child with congenital hemolytic jaundice who is subject to crisis should have a splenectomy performed, preferably between crises. In the presence of a very severe crisis, it is necessary to operate as soon as the patient has been placed in reasonably good condition by carefully spaced transfusions.

Finally a word about the operation of splenectomy is essential. This operation requires a fundamental knowledge of anatomy, skillful surgery and, at times, speed. Certain surgeons appear to possess the knack of delivering the spleen into the operative wound, clamping the splenic pedicle properly and performing the splenectomy—all with a minimum of trauma and wasted motion. In the very serious situation of emergency splenectomy, it is recommended that a surgeon be selected who has had experience in the technic of the operative procedure, and who is known for his adeptness in handling abdominal tissues.

SUMMARY

The appearance in quick succession of three cases of severe hemolytic crisis in one family necessitated emergency splenectomy in all three. Various clinical and hematological features suggested that the hemolytic crises developed because of some alteration outside the bone marrow, perhaps as the result of splenic activation. The operation of emergency splenectomy requires careful pre-operative and operative management.

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REFERENCES

1. Josephs, H. W. Studies in haemolytic anaemia. II. The presence of an antihemolytic factor in human plasma. *Bull. Johns Hopkins Hosp.* 62:53-69, 1938.
2. Naegeli, O. *Blutkrankheiten und Blutdiagnostik: Lehrbuch der klinischen Hämatologie*. Third edition. 662 pp. Berlin: Walter de Gruyter & Co., 1919.
3. Haden, R. L. The mechanism of increased fragility of erythrocytes in congenital hemolytic jaundice. *Am. J. M. Sc.* 188:441-449, 1934.
4. Thompson, W. P. Hemolytic jaundice: its diagnosis, behavior and treatment: review of forty-five cases. *J. A. M. A.* 107:1776-1781, 1936.
5. Dameshek, W. and Schwartz, S. O. Hemolysis as the cause of clinical and experimental hemolytic anemias, with particular reference to the nature of spherocytosis and increased fragility. *Am. J. M. Sc.* 196:769-792, 1938.
6. *Idem.* The presence of hemolysins in acute hemolytic anemia: preliminary note. *New Eng. J. Med.* 218:75-80, 1938.
7. *Idem.* Acute hemolytic anemia (acquired hemolytic icterus, acute type). *Medicine* 19:321-327, 1940.
8. Dedichen, H. G. "Holla-syken": Epidemisk optreden av anemiske kriser ved icterus haemolyticus. *Norsk. mag. f. laegevidensk.* 98:279-295, 1937.
9. Heilmeyer, L. Die Sphärocytose als Ausdruck einer pathologischen Funktion der Milz. *Deutsches Arch. f. klin. Med.* 179:292-306, 1936.
10. Doan, C. A., Wiseman, B. K. and Erf, L. A. Studies in hemolytic jaundice. *Ohio State M. J.* 30:493-504, 1934.

REMOVAL OF OVER 1300 FOREIGN BODIES FROM A STOMACH*

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BRATTLEBORO, VERMONT

FOREIGN bodies in the stomach have received attention in the literature for a great many years. This case is reported because, in addition to the interest of an unusual collection of foreign bodies, it presents several unique features.

I have not been able to find in the literature any case on which three gastrotomies have been per-

ous objects than those in the case reported below. Other cases have been reviewed by Thorek.⁷

CASE REPORT

B. T., a 43-year old former railroad telegrapher, was a mental patient at the Brattleboro Retreat, where he had been committed for the second time, with a diagnosis of manic depressive psychosis, depressive phase. For several months he had been vomiting occasionally, with increasing frequency. There was coffee-grounds vomitus, with the occasional appearance of bright-red blood. The stools were tarry. Careful observation of the patient led the attendants to believe that he was swallowing foreign bodies. X-ray examination on October 10, 1933, at the Brattleboro Memorial Hospital revealed a large, irregular, opaque mass in the cardiac region of the stomach, measuring about 8 by 10 cm., that appeared to be made up of metal, including staples, tacks and wire. Staples and tacks were visualized in the colon on the right side of the abdomen, some of which appeared in the stools following catharsis. On October 19 x ray films showed the gastric mass still present and, in addition, 2 small pieces of metal in the ileum and a short piece of wire in the rectum. The patient was referred for immediate operative treatment, since the vomiting and gastric pain persisted and the general physical condition was becoming steadily poorer.

The patient was very anxious for relief and, contrary to his early denials, freely told of the foreign bodies he had swallowed during a period of 3 or 4 months. Before operation he prepared a partial list of these objects so that they "might not be overlooked." He had covered many of the objects, such as razor blades, needles, pins and glass, with chewing gum or food. He said that, in spite of these precautions, his throat had become very sore at times. He admitted that he had intended to commit suicide, but death in this manner became so uncomfortable that he changed to become a very co-operative patient.

Physical examination showed a moderately emaciated and pale, neurotic patient in some distress from epigastric pain. There was tenderness to pressure in the epigastrium. Other physical findings were normal.

Gastrotomy performed on October 20 revealed a large stomach, with the omentum adherent to the lower third of the lesser curvature. The stomach was opened through a transverse incision opposite this point. Numerous intermingled foreign bodies were removed with forceps and fingers. The entire gastric mucosa, especially that along the lesser curvature, was badly lacerated and friable. The omentum, adherent to the lesser curvature, covered the bed of an ulcer, 4.5 by 3.2 cm., that had eroded through the gastric wall. The tissue immediately surrounding the ulcer was extremely friable. The original gastric incision was extended to permit resection of the ulcer. Closure was made, leaving a drain in the lesser omental cavity because of the friable gastric wall. The pathological report was gastric ulcer.

Classification of the foreign bodies removed showed 69 narrow staples, 24 wide staples, 21 pieces of glass, 1 pen-

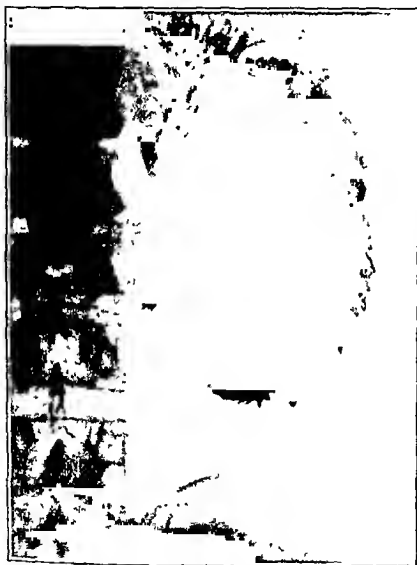


FIGURE 1. X-Ray Film Taken before the Second Operation.

formed, although Matthews¹ and Cannaday² have each reported a patient who underwent two. Other unusual features of this case are the great variety of sharp metallic foreign bodies and the large amount of broken glass ingested without acute perforation of the stomach or the intestines. The third unusual feature, the presence of an enormous benign ulcer that had eroded through the gastric wall, has been noted in a previous report.³ Chalk and Foucar,⁴ Gaylord⁵ and Wardell⁶ are among the few who have recorded a recovery following the removal of heavier or more numer-

*Presented at the annual meeting of the New England Surgical Society, Poland Spring, Maine, September 28, 1940.

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cil lead, 72 miscellaneous metallic foreign bodies, including open safety pins, hairpins, corroded needles, pins, tacks, pieces of safety razor blade, a piece of hacksaw blade and a screw. The total of 187 foreign bodies weighed 97 gm. In addition, 2 small nails, 2 staples and

rence of pain typical of gastric ulceration. He denied having ingested additional foreign bodies. A modified Sippy regime was ineffective. The patient was suffering severely and was losing weight and strength. At this time he was despondent and attempted suicide. As a last

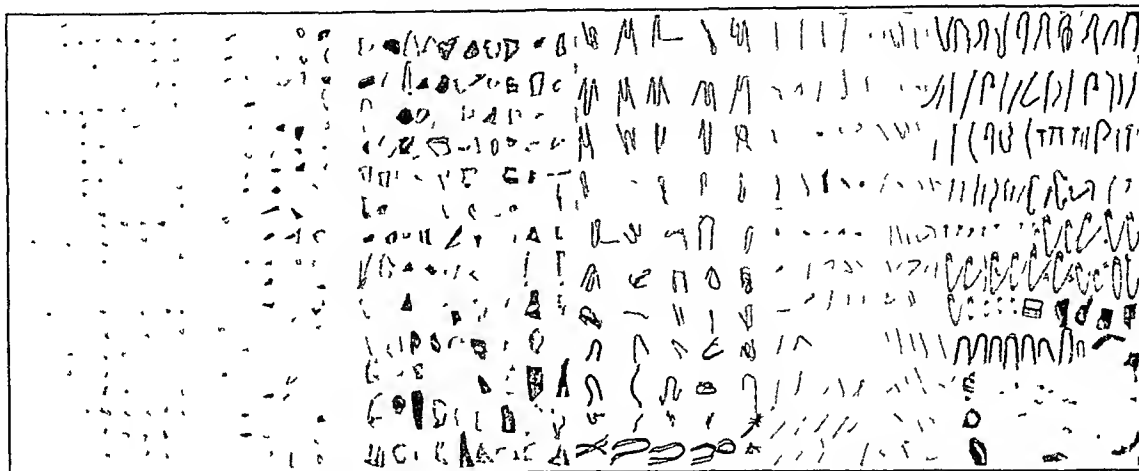


FIGURE 2. Foreign Bodies Removed at the Second Operation.

2 pieces of glass in the intestines were later delivered by enemas.

A gastric fistula opened through the drainage on the 7th postoperative day and closed spontaneously on the

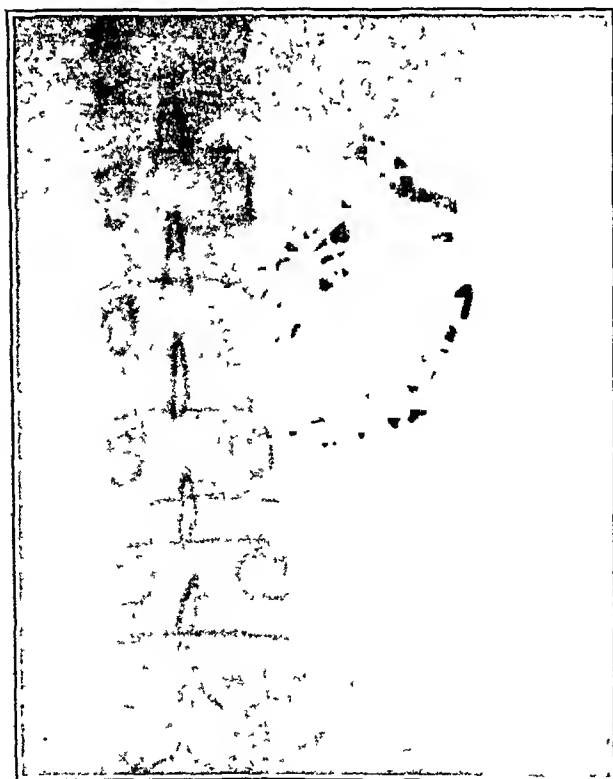


FIGURE 3. X-Ray Film Taken before the Third Operation.

20th postoperative day; it never gave further trouble. The remainder of the wound healed by first intention. The early convalescence was stormy.

The patient was discharged to the Brattleboro Retreat on his 25th postoperative day. Soon he suffered recur-

resort he was placed on a course of Synodal. Coincident with the last treatment, he became free of pain and began to gain weight.

Up to 1938 the patient remained in good health and was free of pain. He took advantage of the liberty given him, with the result that, in July, 1938, 5 years after the first operation, he again complained of pain, had tarry stools, occasionally vomited and admitted having taken foreign bodies. X-ray examination showed opaque bodies in the stomach (Fig. 1). On July 15, a second gastrotomy through a 15-cm. incision of the anterior wall of the stomach revealed a mass of broken glass and a tangle of sharp pointed metallic bodies, surrounded by a semiclear, blackish fluid. The strong odor of the action of hydrochloric acid on iron was very evident. A handful of glass was removed at one time from the cardiac portion of the stomach. Many foreign bodies, including open safety pins, had to be untangled and removed individually. In the distal end of the stomach there was an ulcer large enough to admit the tip of a finger. This had a gray base, had not eroded through the gastric wall and was not disturbed. The gastric mucosa, except for one small area, was in good condition, in marked contrast to its friable condition 5 years previously. Perhaps the absence of razor blades accounted for this. The convalescence was uneventful. Complete laboratory studies were not available at this time, but a gastric analysis after operation showed tremendously high levels of acidity: free hydrochloric acid, 280 units; total acidity, 400 units.

Examination of the material removed showed over 440 pieces of glass and 277 metallic bodies, including wire, pins, needles, open safety pins, nails, a bottle cap and a few fragments from a barbed-wire fence, probably collected on his parole home to the farm. For some reason the patient had not swallowed razor blades this time. The weight of the foreign bodies was 551 gm.

Following the second operation the patient was given less liberty, in spite of which, during the following year, he was found to be ingesting other articles. He complained of some stomach distress, and x-ray films were ordered. These showed more foreign bodies (Fig. 3). Physically the patient was in excellent condition. The only abnormality was a fullness of the left midabdomen, which

gave forth metallic sounds on palpation. On May 4, 1939, the patient was again operated on in the surgical department of the Brattleboro Retreat, under Avertin anesthesia. An upper left rectus incision was used. Adhesions about the stomach were extensive. The mucosa showed little evidence of injury and was not friable. There was a small ulcer near the pylorus, which was not disturbed. A section of the gastric wall removed at this time was examined by Dr Arthur Wright, of Albany, New York, who reported as follows:

The mucosa is focally hemorrhagic and subcutely inflamed. The submucosa is diffusely hemorrhagic,

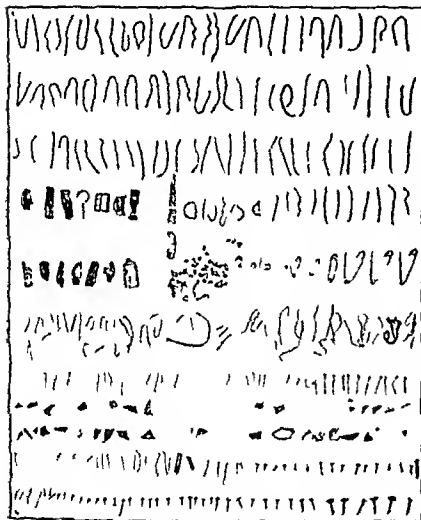


FIGURE 4 Foreign Bodies Removed at Third Operation

edematous and moderately inflamed. Strands of fibrin are present in the interstitial fluid of the submucosa. Diagnosis: mild subacute and acute hemorrhagic gastritis.

As previously, the stomach contents were extremely tangled. Removal of this mass of sharp metal and glass was hazardous to the hand within the stomach. Much care had to be taken not to tear the stomach wall while removing pins and needles.

Examination of the material recovered at the third gastrotomy, nearly 6 years subsequent to the first, showed over 425 foreign bodies, including wire, pins, toothpaste tubes, glass, tacks and so forth (Fig 4). A nail file was recovered in 3 pieces. The total weight was 295 gm. The convalescence was uneventful.

In the three gastrotomies, 1329 foreign bodies, with a total weight of 943 gm., were successfully removed.

At present the patient is not ingesting foreign bodies so far as is known. He is quite stable mentally and has just been released on parole. He states that he feels in perfect health and denies eating other than a normal diet.

SUMMARY

A case is reported in which, at three operations

over a period of six years, more than 1300 foreign bodies, weighing nearly 950 gm., were removed from the stomach.

4 Elliot Street

REFERENCES

- 1 Matthews G C cited by Thorek⁴
- 2 Cannady J E Foreign bodies in the stomach and intestines. *Ann Surg* 94 218 232 1931
- 3 Wheeler P H Enormous benign gastric ulcerations caused by multiple foreign bodies. *New Eng J Med* 214 830 832 1936
- 4 Chalk S G and Foucar H O Foreign bodies in the stomach: report of a case in which a life than two thousand five hundred foreign bodies were found. *Arch Surg* 154 494 500 1928
- 5 Gayford cited by Chalk and Foucar⁴
- 6 Widdell W H cited by Chalk and Foucar⁴
- 7 Thorek M Large collection of foreign bodies in the stomach: report of case with review of literature. *Internat Clin* 31282 290 1924

DISCUSSION

DR ARTHUR W ALLEN, Boston DR Wheeler's case made exactly the same impression on me that it obviously has made on you. I have had no such experience as this in dealing with foreign bodies in the stomach. I do not mean to imply that in Massachusetts there is a lower percentage of mentally unstable persons than in Vermont, but for some reason or other I have not encountered any one with such an extreme craving for a metallic diet.

There are certain interesting features of this case that I should like to mention. One is that this is the highest gastric acidity I have ever seen recorded. One wonders whether the high acidity had any bearing on the patient's desire for such a diet, or whether the presence of the foreign bodies had an influence on the activity of the acid cells.

A striking fact concerning traumatic ulcer is brought out. Dr Wheeler very properly excised the enormous ulceration in the first operation, since it was perforating, but in the second and third, he left the benign ulcers alone. In spite of the very high gastric acidity, this patient apparently had no further trouble from peptic ulcer after the foreign bodies were removed. This is at least some evidence that there are other factors in the development of peptic ulcer than trauma and acidity, although acidity is necessary in the production of any experimental ulcer.

In addition to the psychopathic patient who swallows foreign bodies, there are certain normal people who accidentally get into similar difficulties. One of the most interesting cases of this sort that has come under my care was that of a middle-aged woman who was admitted to the hospital having had periodic attacks of complete pyloric obstruction. The x-ray examinations were slightly confusing in that there seemed to be a shadow, or possibly two shadows, in the stomach that resembled a polyp. These shadows shifted from one portion of the stomach to another. Dr Edward Benedict examined the patient gastroscopecally and saw two foreign bodies that looked to him like the pits of peaches or prunes. I performed a gastrotomy and removed two good-sized peach pits, one of which was quite smooth. The symptoms were doubtless due to the occasional engagement of one of these foreign bodies in the pyloric ring. The patient had no recollection of having swallowed these stones.

I believe that one of the earliest gastrotomies for foreign body at the Massachusetts General Hospital was done by Dr Maurice Richardson, when he operated on a man who had inadvertently swallowed his false teeth.

STRUMA LYMPHOMATOSA

Report of a Case Complicated by Myxedema

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STRUMA LYMPHOMATOSA (Hashimoto's disease) is a lymphoid goiter characterized by a growth of lymphatic elements and the formation of lymphoid follicles, together with certain changes both in the parenchyma and interstitial tissues of the thyroid gland. The condition was first described by Hashimoto¹ in 1912.

Hashimoto considered this disease a separate entity, not to be confused with Riedel's² disease. The essential clinical feature of the latter is a widespread involvement of the extrathyroid tissues in a diffuse sclerosis that appears to originate in part of the thyroid gland.

Very little was reported on this subject until Ewing³ in 1922 confused the picture by coming to the conclusion, following the study of 4 cases, that Hashimoto had described the earlier and Riedel the later stages of the same disease, which he called a benign granuloma of the thyroid gland. As a result of Ewing's view, no attempt was made in the numerous subsequent reports to distinguish between these two conditions. Even within the last few years several authors have held to this view. The assertion of Renton et al.⁴ in 1938 that Riedel's disease is characterized by lymphocytic infiltration with or without giant cells conforms closely to Hashimoto's description and not to Riedel's. Jaffe⁵ whose work, published in 1937, was chiefly confined to autopsy material, also supported Ewing by urging that the differences between the two conditions are qualitative only.

Boyden, Collier and Bugher,⁶ in 1935, stated: "It is our opinion that the conditions described by Riedel and Hashimoto cannot be differentiated either clinically or pathologically. Furthermore, we do not believe that the process is a distinct entity." Vaux,⁷ in 1938, came to the conclusion that Riedel's disease and Hashimoto's disease are stages of the same pathologic condition. Microscopically three stages, which merge into each other, can be distinguished — early, intermediate and late. The pathologic changes are the same in all stages, the degree of change being the varying factor. Eisen⁸ in reporting 7 cases of Riedel's struma, 3 of which were of the Hashimoto type, concluded that the two conditions are different morphologic manifestations of the same disease process.

On the other hand, numerous authors have expressed the opinion that the diseases are distinct entities. Graham and McCullagh⁹ in 1931 and Graham¹⁰ in 1931 from a review of the literature pointed out that Riedel's disease and struma lymphomatosa are distinct and distinguishable. Graham stated that of the 104 cases reported in the literature, 41 could be accepted as Riedel's disease and 24 as Hashimoto's disease, the remainder coming under the different forms of chronic thyroiditis. As a result of his work, the cases subsequently reported were more clearly differentiated as Hashimoto's or Riedel's disease, although enough confusion still exists to make it difficult to classify some of the cases.

Hashimoto's views were upheld and in part confirmed by Heineke¹¹ in 1914 and Reist¹² in 1922. Williamson and Pearse¹³ in 1925, and again in 1929, described the same condition under the name of lymphadenoid goiter. Hellwig¹⁴ in 1938, Clute, Eckerson and Warren¹⁵ in 1935, Mallory¹⁶ in 1935 and 1936, Emerson¹⁷ in 1935, Gilchrist¹⁸ in 1935, McClintock and Wright¹⁹ in 1937, Lee and McGrath²⁰ in 1937, Lee²¹ in 1935, Poer, Davison and Bishop²² in 1936 are also in essential agreement.

However, the apparent confusion still exists. When Perman and Wahlgren²³ in 1927 tried to prove their view in reporting a case of true Riedel's disease, they were able to show that specimens of pathologic tissue removed at two operations a year apart were of almost identical histologic structure, thus refuting the view that in the early stages of Riedel's disease the histologic findings correspond to what Hashimoto described.

Opposed was a parallel case published by Heyd²⁴ in 1929, in which the material removed at the first operation was typical of Hashimoto's disease, whereas a section removed thirteen months later showed an increased fibrosis, suggesting an approach to Riedel's disease.

It is obvious that more work and experience with cases of these diseases are needed to clarify the existing opinions.

Joll,²⁵ who has published the most recent work on the two conditions, whose thorough survey of the literature is excellent and whose personal *experience is greater than that of any other person*, — he has had 51 cases in his private prac-

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tice and the communicated knowledge of 30 unpublished ones,—is thoroughly in accord with the belief that the diseases are two different entities. His views should be given preference until other investigators have collected as great a number of cases or can in other ways disprove his findings.

Hashimoto claimed that the disease rarely occurred before the age of forty; this age incidence was confirmed by Joll, although the latter knew of a case in a girl of ten. A few cases between the ages of twenty and forty are recorded in the literature. In Riedel's disease, the highest incidence occurs earlier in life, that is, between the ages of twenty-five and thirty-five. In the cases so far reported, there is a marked preponderance of women among patients with Hashimoto's disease, whereas almost the reverse is true in Riedel's disease.

Joll has thoroughly reviewed the pathologic anatomy and histological studies, so that they do not require repetition. Although numerous views have been expressed, the etiology of these diseases remains unknown.

Several recent authors differ as to whether these cases can be diagnosed clinically. Joll believes that once the problem has resolved itself into a differential diagnosis of Hashimoto's and Riedel's diseases, a diagnosis can be made. He states:

A firm goitre which appears in a middle aged patient, usually a woman, reaches its maximum in a few months, and involves every part of the gland, causes only a moderate degree of dyspnoea, but produces neither serious pressure effects, thyrotoxic symptoms, pain, tenderness, pyrexia nor other inflammatory phenomena, is almost certainly a struma lymphomatosa. If to these features be added *absence* of any evidence of involvement of extrathyroid tissues and *presence* of some degree of hypothyroidism, the diagnosis is placed beyond a peradventure

Boyden et al.⁸ state, "Positive clinical diagnosis of the condition is practically impossible either before or at the time of the operation, and one must depend on the pathologist to rule out malignancy, especially when clinical findings suggest Riedel's disease." Clute et al.¹⁰ remark, "It is believed that rarely, if ever, can a diagnosis of struma lymphomatosa be made from clinical examination." Graham,^{9,10} on the other hand, believes that a clinical diagnosis should be made on clinical and gross findings, but that a preoperative diagnosis in cases of hyperthyroidism is impossible.

The following listing of characteristic findings is taken from Joll²⁵:

HASHIMOTO'S STRUMA

It preponderates in women from forty five to sixty years of age.

There is a tendency to myxedema.

All parts of the thyroid gland are involved, but nothing outside. The goiter is sometimes large but never woody hard

Pressure effects are seldom severe.

The histologic structure, which varies with the stage of the disease, is characteristic.

RIEDEL'S DISEASE

It occurs in younger men and women than does struma lymphomatosa.

There is little tendency to myxedema except after radical operation

The disease is usually unilateral with extension to extrathyroid structures. The goiter is small, intensely hard and smooth

Grave pressure effects are the rule

The mass is formed of dense scar tissue

Nearly all authors agree that surgical intervention in cases of struma lymphomatosa is contraindicated, especially in those associated with any signs of hypothyroidism. It is justified only in cases associated with hyperthyroidism; even then, they hold, only enough of the gland should be removed to relieve pressure symptoms or to establish a diagnosis, thus ruling out cancer. All are agreed that myxedema develops in over 50 to 60 per cent of cases, and that following operation this is in most cases brought on much earlier. If struma lymphomatosa is diagnosed and not treated, the basal metabolism rate should be determined frequently to detect the onset of myxedema. Whenever signs of hypothyroidism are evident, thyroid medication should be instituted.

Renton et al.⁴ have had good results in the treatment of struma lymphomatosa with x ray and recently with radium therapy. They think that the latter is almost a specific for this type of goiter, and 1 case that they have followed for five years has shown no signs of hypothyroidism.

The following case is interesting in that it occurred in a young woman who was followed clinically for thirteen years.

CASE REPORT

A 26-year-old woman was first seen at a Boston clinic in January, 1926, when she complained of a goiter. She had had this for 3 years and 6 months and had noticed increasing nervousness and a weight loss of 25 pounds. The basal metabolic rate on entry was +41 per cent, the body weight 150 pounds. A subtotal thyroidectomy was performed on January 22, and the specimen was reported to show primary hyperplasia, follicular type. The clinic record states that the patient was markedly improved after operation; by October, 1926, the basal metabolic rate was -4 per cent and the body weight 190 pounds. When she returned to the clinic in April, 1938, she weighed 245 pounds. The blood pressure on two occa-

sions was 134/100 and 158/130, but later fell to 120/70. The basal metabolic rate was -23 per cent.

The patient was placed for 8 days in a Boston hospital, where, after being put on an 800-calorie diet and given diuretics and small doses of amphetamine (Benzedrine), she lost 23 pounds. She felt much improved. She returned to the hospital in May, where she remained for 3 months. The weight was then 236 pounds and the basal metabolic rate -24 per cent. A systolic murmur was noted over the mitral area. A chest examination by fluoroscopy and stereoscopy showed the heart to be enlarged, so that there was a suggestion of rheumatic heart disease with mitral stenosis. The urine continually showed a slight to large amount of albumin. The patient was again placed on an 800-calorie diet and given Salyrgan and small doses of thyroid. About 10 days after admission jaundice was noted and there was marked tenderness under the costal margin. Duodenal drainage showed much pus and bile pigment. The blood bilirubin rose progressively from 1.6 to 19.0 mg. per 100 cc. With dehydration the nonprotein nitrogen rose to 50 mg. per 100 cc. and the patient was drowsy and irritable. When fluids were given she was more edematous, and ordinary diuretics did not cause diuresis. Injections of 50 per cent glucose intravenously, however, did produce a good diuretic effect. A gallop rhythm was noted during this period. X-ray examinations of the skull and of the long bones were negative. An electrocardiogram showed normal rhythm with low voltage and an inverted T_4 . By the middle of August, the jaundice had entirely disappeared and there was less abdominal tenderness, but the patient was still quite weak, and cyanotic on the slightest exertion. She continued to be markedly edematous in spite of the use of vitamins, ammonium chloride, potassium chloride, 50 per cent glucose and digitalis. No definite diagnosis was made. The patient was discharged on August 20.

Following discharge the patient remained at home and in bed. One of us (N. S. S.) was called on August 24, when she showed marked edema of the abdomen and lower extremities. The abdomen was redundant and reached the level of the junction of the upper and middle thirds of the thighs. She had become almost anuric, having passed but 120 cc. of urine in 48 hours. Other physical findings were the same as those in the previous hospital entry. The fluids, which had been restricted, were forced, and the patient was treated symptomatically. She began to show marked improvement after the 5th week at home. By November the pitting edema of the extremities had decreased to a point where it was barely noticeable. Edema of the abdomen had markedly receded, so that it barely overlay the inguinal fold. The patient continued, however, to have localized areas of tenderness, chiefly over the abdomen and lower extremities, varying from day to day. By December she was voiding 900 to 1200 cc. of urine, although her intake was limited to 900 cc. Several attacks of jaundice in this interval were transient and cleared up in 4 or 5 days. At about this time the nails became very brittle and the loss of hair of the head became very noticeable. However, the beard increased so that it required shaving.

In the first week in December the patient became mentally upset and disturbed and was very irrational, incoherent and noisy. At this time she was seen by a neuropsychiatrist, who considered the case to be one of beginning beriberi with peripheral neuritis. She had improved considerably by the early part of January, 1939, so that she could help herself in bed; but she began to put on weight again, the abdomen began to enlarge, and the extremities showed a return of pitting edema. On February 13, she was referred to the Joseph H. Pratt Diagnostic

Hospital, under the supervision of Dr. S. J. Thannhauser.

Physical examination showed an extraordinarily large young woman lying helpless in bed. The facies suggested myxedema (Fig. 1). She looked pale. The blood pressure was 100/75 (right arm). The skin was markedly roughened, especially over the lower forearms and the backs of the hands, where there was superficial scaling over a reddish mottling. The skin appeared atrophic in these areas. The superficial scaling was seen also over



FIGURE 1.

Note the obesity and the few hairs; the patient shaved every few days.

the lower legs (Fig. 2). There was an obvious beard around the chin and some hair near the breasts. The pubic hair had a male distribution. The pupillary reactions were normal. The scleras appeared clear; the palpebral conjunctivas were pale. The external ocular movements were normal with no lid lag or nystagmus. The fundi showed well-defined disks, and the retinal fields were normal. By confrontation test the visual fields were adequately large and not defective. The teeth were widely spaced. The tongue was well papillated. The size of the heart could not be determined by percussion because of the obesity; the action was rhythmical and rather rapid. A late systolic blowing murmur was heard along the left sternal border and especially well in the pulmonic area. The vascular pulsations in the neck were wide. No other murmurs were heard in the heart. The lungs were normally resonant, and no rales were heard; the breath sounds were of normal character. The abdomen was flabby, broad and table-like in complete relaxation. No liver or spleen could be felt. There were many striae in the lower quadrants of the abdomen, some appearing reddish and others as pale white cicatrices. There was moderate pitting edema of the dependent abdominal wall, which overlay the flanks and pubis. In the fold of this apron there were excoriations, more marked on the left

side. The arms were small compared with the elephantine legs. The fingernails were almost completely white, owing to superimposed transverse white lines.

Laboratory studies gave no helpful data for the diagnosis of the underlying condition. Basal metabolic studies were not satisfactory.

The patient was kept on a 1000-cc. intake; the urinary output varied between 300 and 550 cc. Early in her stay

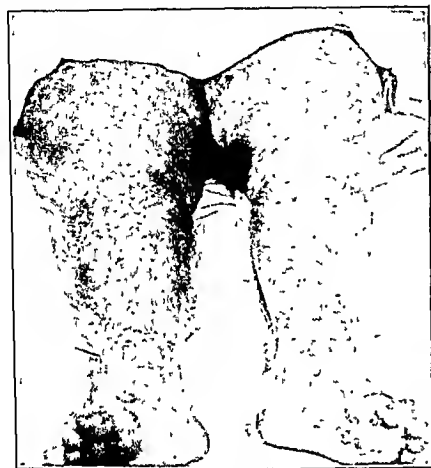


FIGURE 2.

The legs show edema and superficial scaling.

the drainage of the edema fluid from the legs and thighs was carried out by the use of cannula-like needles, but this was not continued because of the appearance of inflammation in the areas of drainage and a rise in the white-cell count, even in the absence of fever.

A skin biopsy was reported as consistent with scleroderma. Following this there was infection of the biopsy wound and a purulent infection of the tip of the left middle finger, and the patient had fever for the first time. Sulfanilamide—15 gr. every 4 hours—was therefore started, but its effect could not be followed since the patient was discharged home on the following day. The fever eventually disappeared.

Following discharge the patient became progressively worse, and died about 3 weeks later, or 13 years after she had come under observation.

Autopsy. The body was that of an obese, edematous woman, 155 cm. tall and weighing 180 pounds. The breasts were practically nonexistent because of the lack of breast tissue. There was extreme pitting edema of the ankles, legs and thighs. The face showed a moderate beard on both cheeks and the chin, with a slight tendency to growth of hair on the upper lip. The pubic hair was scanty and triangular in distribution; the axillary hair was normal. Both legs and arms showed considerably more than the usual amount of hair for a woman. There was a well-healed surgical scar, 8 cm. long, extending around the base of the neck. There were large intertriginous erosions in both inguinal regions, due to the sagging of the abdominal wall onto the thighs. There was a 6-by-1-cm. draining sinus in the lateral aspect of the thigh just below the crest of the ilium. The skin of the

face showed an extremely fine wrinkling; that of the abdomen and legs was coarser, and was peculiar in that the epidermis seemed to be separated from and wrinkled over the dermis.

Dissection of the thyroid area revealed two small pieces of what was probably the thyroid gland, totaling less than 1 cm. in diameter.

The heart weighed 450 gm. The myocardium was pale and flabby. The coronary arteries and valves were normal.

The liver weighed 2100 gm. It cut with increased resistance, and the cut surface was somewhat yellow. Close examination suggested an exceedingly fine distribution of excess fibrous tissue throughout the liver, but there was no gross scarring. The lobular markings were normal.

The pituitary gland, adrenal glands and ovaries showed no tumors grossly or microscopically.

Microscopically, the peritracheal tissue consists of a dense collagenous scar, with some muscle embedded in it; scattered through the scar are slight remnants of thyroid tissue made up of flat epithelium or Hürthle's cells making a feeble attempt at acinar formation; not more than 15 acini that contain colloid are found. The thyroid tissue is chiefly represented by disorganized masses of Hürthle's cells with lymphocytic infiltration about them



FIGURE 3.

This remnant of the thyroid gland shows a poorly formed acinus and lymphocytic infiltration.

(Fig. 3).^{*} Also embedded in the scar tissue is a normal-appearing parathyroid gland. The heart presents a striking picture throughout most of the section—especially in regions where muscle bundles are transected—of isolation of each muscle bundle by delicate fibrous tissue and edema. About the blood vessels the amount of fibrosis becomes more marked, and in many places the muscle lobules are separated by fatty infiltration. In some areas many fibroblasts, some appearing quite young, are visible.

^{*}These findings are practically identical with those in the thyroid tissue removed in 1926.

Occasional polymorphonuclear cells and lymphocytes are scattered through this delicate, extensive fibrous stroma. Many dilated capillaries, where endothelial walls appear slightly thickened, are present, and many spaces that appear to be widely dilated lymphatics are also in evidence. The liver shows extreme fatty metamorphosis, so that the tissue looks like pure fat except for small patches of liver cells near the portal areas that are relatively normal. The most striking feature is the uniformity of the size of the cytoplasmic vacuoles. Sections of skin are consistent with scleroderma.

A culture of the edema fluid from the left thigh near the incision showed a hemolytic streptococcus.

SUMMARY

A case of struma lymphomatosa (Hashimoto's disease) is reported. The case is of particular interest because the patient was only twenty-six years old when first seen, because the initial symptoms were those of hyperthyroidism, because she developed myxedema during the thirteen years that the case was observed, and because thyroid tissue removed in 1926 could be compared with that obtained at autopsy in 1939.

REFERENCES

1. Hashimoto, H. Zur Kenntnis der lymphomatösen Veränderung der Schilddrüse (Struma lymphomatosa). *Arch. f. klin. chir.* 97:219-248, 1912.
2. Riedel, Ueber Verlauf und Ausgang der Strumitis chronica. *München. med. Wchnschr.* 57:1946, 1910

3. Ewing, J. *Neoplastic Diseases: A treatise on tumors*. Third edition. 1127 pp. Philadelphia: W. B. Saunders Company, 1928.
4. Renton, J. M., Charteris, A. A. and Heggie, J. F. Riedel's thyroiditis and its treatment by radium. *Brit. J. Surg.* 26:54-70, 1938.
5. Jaffe, R. H. Chronic thyroiditis. *J. A. M. A.* 108:105-110, 1937.
6. Boyden, A. M., Collier, F. A. and Bugher, J. C. Riedel's struma. *West. J. Surg.* 43:547-563, 1935.
7. Vaux, D. M. Lymphadenoid goitre: study of thirty-eight cases. *J. Path. & Bact.* 46:441-446, 1938.
8. Eisen, D. The relationship between Riedel's struma and struma lymphomatosa (Hashimoto). *Canad. M. A. J.* 31:147-150, 1934.
9. Craham, A. and McCullagh, E. P. Atrophy and fibrosis associated with lymphoid tissue in the thyroid struma lymphomatosa (Hashimoto). *Arch. Surg.* 22:548-567, 1931.
10. Craham, A. Riedel's struma in contrast to struma lymphomatosa (Hashimoto). *West. J. Surg.* 39:681-689, 1931.
11. Heineke, Die chronische Thyreoiditis. *Deutsche Ztschr. f. Chir.* 129:189-220, 1914.
12. Reist, A. Ueber chronische Thyreoiditis. *Ztschr. f. Path.* 28:141-200, 1922.
13. Williamson, G. S. and Pearce, I. H. The pathological classification of goitre. *J. Path. & Bact.* 28:361-387, 1925. Lymphadenoid goitre and its clinical significance. *Brit. M. J.* 1:4, 1929.
14. Hellwig, C. A. Lymphadenoid goiter. *Arch. Path.* 25:838-849, 1938.
15. Clute, H. M., Eckerson, E. B. and Warren, S. Clinical aspects of struma lymphomatosa (Hashimoto). *Arch. Surg.* 31:419-428, 1935.
16. Case records of the Massachusetts General Hospital. Case 21491. *New Eng. J. Med.* 213:1140-1143, 1935. Case 22311. *Ibid.* 215:200-203, 1936.
17. Emerson, C. Struma lymphomatosa (Hashimoto), with report of ninth case. *Nebraska M. J.* 20:58-60, 1935.
18. Gilchrist, R. K. Chronic thyroiditis. *Arch. Surg.* 31:429-436, 1935.
19. McClintock, J. C. and Wright, A. W. Riedel's struma and struma lymphomatosa (Hashimoto) a comparative study. *Ann. Surg.* 106:11-32, 1937.
20. Lee, C. M., Jr. and McGrath, E. J. Struma lymphomatosa (Hashimoto): survey of literature and report of case. *Surgery* 2:238-246, 1937.
21. Lee, J. G. Chronic non-specific thyroiditis. *Arch. Surg.* 31:982-1012, 1935.
22. Poer, D. H., Davison, T. C. and Bishop, E. L. Struma lymphomatosa (Hashimoto) report of a case. *Am. J. Surg.* 32:172-175, 1936.
23. Perman, E. and Wahlgren, F. A case of chronic thyroiditis (Riedel). *Acta chir. Scandinav.* 61:535-542, 1927.
24. Heyd, C. G. Riedel's struma benign granuloma of the thyroid. *S. Clin. North America* 9:493-513, 1929.
25. Joll, C. A. Pathology, diagnosis, and treatment of Hashimoto's disease (struma lymphomatosa). *Brit. J. Surg.* 27:351-389, 1939.

LIMITATIONS OF GASTROSCOPY*

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ALTHOUGH fully cognizant of the valuable objective information that can be obtained through the semiflexible gastroscop in intragastric disease, we have nevertheless found that this method of examination, like every other endoscopic one, has distinct limitations. Since these are not sufficiently emphasized in the current literature on gastroscopy, and are therefore probably not well recognized by the medical profession, we believe that to call attention to them is timely and may help in the proper evaluation of the clinical use of the gastroscop.

In 1932 the Wolf-Schindler gastroscop was devised and its practicality demonstrated. Previously, when only rigid gastroscopes were available, there had been a distinct danger of perforation of the esophagus during gastroscopic examination. Moreover, it required considerable skill to introduce the gastroscop with even relative safety and com-

fort to the patient. The procedure was therefore limited to a small group of experts. All this was changed completely when the semiflexible gastroscop became available. To introduce it requires no unusual skill, and with some experience the examination can be performed expeditiously, safely and without undue discomfort.

In all large medical centers, as well as in many small hospitals, examination through the semiflexible gastroscop is now performed and dependable observations are made. This has resulted in a large and rapidly growing literature on the subject. Three monographs on gastroscopy have been published since 1932: Moutier's¹ in French and Henning's² in German were published in 1935, and Schindler's³ book in English appeared in 1937. Much of this literature is pioneer work; besides contributions to the early descriptions of the technic and of the indications and contraindications of gastroscopy, numerous papers⁴⁻⁷ have outlined the normal gastroscopic picture and its changes in the presence of disease. The gastroscopic findings

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in such common diseases as gastritis,⁸⁻⁹ gastric ulcer¹⁰⁻¹¹ and cancer¹²⁻¹⁵ have also been described; the differential diagnosis of ulcer and cancer of the stomach as seen through the gastroscope has been discussed and the roentgenographic and gastroscopic evidences of intragastric disease compared.¹⁶⁻¹⁷

A perusal of the literature reveals a great deal of enthusiasm among the authors, who record many cases, often checked by roentgen-ray study, surgery or autopsy, wherein this method of examination disclosed otherwise hidden or overlooked disease of the stomach. In a previous contribution we¹⁸ have reported a series of similar cases. However, in that study we called attention to some difficulties in diagnosis and recorded some errors in interpretation. With growing experience in gastroscopy, we became more conscious of the many difficulties of the method, the shortcomings of the instrument and the various limitations of the procedure.

During the last three and a half years we have performed over 800 gastroscopies, every case having been examined and the observations checked by both of us. All cases had at least one gastrointestinal roentgen-ray examination. In all cases the gastroscopic findings were compared with the roentgen ray films, as the only other method of morphological visualization of the stomach short of an exploratory laparotomy. This has taught us the value of both procedures; and as clinicians who use every method at our disposal to arrive at a correct diagnosis, we are convinced that neither method should supersede the other. On the contrary, they complement one another, and both should be used in cases where intragastric disease exists or is suspected. The range of the gastroscope is extremely limited as compared with that of the roentgen ray. It can show the appearance of the mucous membrane of the stomach, but it is, of course, completely unsatisfactory in lesions that involve any other portion of the digestive tract. Another limitation is the inability to obtain biopsy specimens; microscopic confirmation of the observed lesion or lesions is thus rendered impossible. Furthermore, even in its limited field the gastroscope is not infallible. Because of constantly changing view caused by both gastric peristalsis and respiratory movements, small localized lesions of the gastric mucosa may be visualized only at variable times during a gastroscopic examination, and may thus be entirely overlooked. Often one of us has readily located a small lesion such as a superficial ulcer or small polyp, whereas the other at the same examination has found it most difficult to confirm the observation. Also, the discovery of changes in the mucous mem-

brane of the stomach does not necessarily mean that the symptoms are caused by such changes. In fact, secondary changes in the gastric mucosa often accompany disease of the duodenum, gall bladder, liver, heart or other organs. Furthermore, the symptoms of hypertrophic gastritis, especially when it is accompanied by fissures or superficial ulcerations, may simulate those of peptic ulcer. However, if a duodenal ulcer is demonstrated roentgenologically and evidence of hypertrophic gastritis is shown by gastroscopy, we believe that the former condition in all likelihood explains the symptoms. On the other hand, the same gastroscopic findings in the absence of a demonstrable ulcer either in the stomach or duodenum probably account for the digestive symptoms. Thus their relation to all the other evidence determines the diagnostic significance of the gastroscopic findings. In other words, only by intelligent coordination of all these data in the light of clinical experience and judgment can the errors of diagnosis be minimized.

Lesions of the antrum involving the lesser curvature may not be demonstrated by gastroscopy. The fault is with the gastroscope in use at present, which does not permit the proper visualization of this portion in a certain type of stomach. Unfortunately, this is a very frequent seat of peptic ulcer and early carcinoma, which may thus be overlooked in a gastroscopic examination. The following case is illustrative.

CASE 1 E H., a 59 year old man, had epigastric pain of 2 years' duration. The pain usually developed 2 hours after meals and was relieved by the intake of food or soda. Coincidentally there were gas and frequent eructations. The bowel movements were regular, and there had never been bloody or tarry stools. Physical examination was essentially negative. Roentgen ray examination showed in the prepyloric region a constant, irregular, filling defect suspicious of early carcinoma. Gastroscopy revealed evidence of atrophic changes in the mucosa but no demonstrable lesion in the antrum. Because of the suspicious roentgenological findings, the patient was operated on, and an ulcerating lesion on the lesser curvature of the antrum was found and resected, microscopic examination showed it to be benign.

Gastroscopy may fail to demonstrate cancer in cases in which the stomach cannot be properly distended with air, and considerable food residue, which has not been evacuated by the usual procedure, may obstruct the view. At times the differential diagnosis between cancer of the stomach and localized hypertrophic gastritis is extremely difficult or even impossible on a single examination with a gastroscope. Case 2 is cited to demonstrate the latter difficulty.

CASE 2 I O., a 62 year old man, was admitted to the hospital complaining of abdominal pain and alternating constipation and diarrhea of 4 or 5 months' duration. Dur-

ing this period he had lost 6 pounds in weight, had become weak and had lost his appetite. Physical examination was entirely negative. The chemical constituents and the cells of the blood were within normal limits. The stools contained no occult blood. Roentgen-ray examination raised the question of a scirrhus carcinoma of the stomach. Gastroscope revealed a mucous membrane that appeared infiltrated and showed large reddened and partially ulcerated ridges. The gastrosopic diagnosis was cancer of the stomach. The patient refused operation and is now, 16 months later, entirely symptom-free; he has gained weight and is able to follow his usual occupation.

Everyone realizes the difficulties of the clinician and the surgeon in differentiating some cases of ulcer of the stomach and ulcerating carcinoma. It was hoped—and as a matter of fact it has been stated in the literature—that this differential diagnosis could always be made by gastroscope. However, this is not always so in our experience. We have erred in both directions in such cases and do not depend on a single gastrosopic examination; but if the case can be followed by repeated examinations, the diagnosis often becomes obvious. Case 3 illustrates the difficulties that can be encountered.

CASE 3. P.S., a 46-year-old man, was admitted to the hospital complaining of heartburn and belching of 20 years' duration. Two years previously the patient had an episode of melena and syncope. Roentgen-ray examination of the gastrointestinal tract at that time revealed nothing abnormal. One month prior to entry the patient developed epigastric pain associated with belching. He had lost 8 pounds. Physical examination on admission revealed an apprehensive patient with tenderness just below the umbilicus. Gastric analysis revealed no free hydrochloric acid, even after the administration of histamine. A gastrointestinal roentgen-ray examination showed an irregular mass occupying the superior and medial borders of the cardiac end of the stomach. Gastroscope showed a large, irregular, ulcerating lesion just below the cardioesophageal opening, which was interpreted as being a cancer. At operation a large soft peptic ulcer was found on the anterior wall of the cardia. It was resected and was shown microscopically to be benign.

One of the most trying experiences in performing a gastroscope is to examine a patient in whom the roentgen-ray examination has demonstrated a definite niche about the upper third of the lesser curvature of the stomach, and still to fail to visualize the lesion; we have had several such experiences. The following case, in which two gastroscopies failed to show the ulcer, is illustrated.

CASE 4. M.A., a 67-year-old man, entered the hospital complaining of epigastric distress that came 1 to 2 hours after meals and was relieved by the ingestion of soda. He had lost 15 pounds in weight and was referred to the hospital because he did not respond to ambulatory ulcer management. Physical examination was essentially negative. Laboratory examination revealed no relevant deviations from normal. X-ray examination showed a large ulcer

niche on the lesser curvature. Two gastroscopic examinations showed a diffuse reddening of the entire gastric mucosa and no evidence of an ulcer.

In stomachs examined postoperatively the gastroscope frequently gives decisive information of the presence or absence of gastritis, marginal ulcer and so forth. However, it is an unpleasant experience to have to record the inability to visualize a stoma when roentgen-ray study has demonstrated a well-functioning gastroenterostomy. A marginal ulcer, particularly if it is on the jejunal side of the stoma, may also be overlooked. This is illustrated by the following case.

CASE 5. A.D., a 39-year-old man, had five admissions to the hospital between June, 1934, and July, 1939. A diagnosis of duodenal ulcer was made in 1934, and because of persistent pyloric obstruction a posterior gastroenterostomy was performed. On July 21, 1938, a roentgenological diagnosis of a functioning posterior gastroenterostomy was made. An old duodenal ulcer was also shown, and the question of a marginal ulcer was raised. A gastroscope performed on July 25 showed greatly enlarged and tortuous rugae. No gastroenterostomy stoma was seen. Eleven months later the patient was readmitted complaining of severe epigastric pain of 3 hours' duration. The abdomen was rigid throughout. There was marked muscle spasm and rebound tenderness. The patient was operated on the same day, and a perforation of a marginal ulcer was found.

In the presence of an hourglass constriction of the stomach the distal portion cannot be visualized. Thus, although the actual constriction can be seen, the underlying disease may often be overlooked.

Besides these limitations certain other conditions prevent a gastroscope or contraindicate the introduction of the instrument. In our experience, a small percentage of patients are temperamentally unfit to go through with this examination. In such cases, because of the danger to the uncooperative patient as well as possible damage to the gastroscope, the examination cannot be properly performed. Any serious disease, obstructive or otherwise, of the esophagus is a contraindication to gastroscope. In cases of severe curvature of the spine or arthritis of the cervical spine, it is frequently impossible. Serious cardiac disease and aneurysm of the aortic arch contraindicate the procedure, as does uncontrollable cough or dyspnea, whatever the cause. Gastroscope is best avoided in peritonitis, perforated ulcers and acute illnesses with fever. We have also refrained from performing it during acute gastric hemorrhage, although others do not consider this a contraindication. In most of these cases morphologic evidence of intragastric disease can be obtained by roentgen-ray examination.

SUMMARY

One can say that the intelligent co-ordination of roentgen-ray and gastroscopic examinations as the only two clinical methods for the visualization of the stomach will diminish the error in gastric diagnosis. The two procedures are not antagonistic; on the contrary, they are complementary. Whereas roentgenograms give a great deal of morphological information about the stomach and other intra-abdominal organs, the gastroscope is limited in its field of usefulness. Even failure to observe any pathologic lesions or changes within the gastric mucosa does not exclude intragastric disease. On the other hand, when changes are seen through the gastroscope a lesion is undoubtedly present, but the interpretation of the findings may be difficult. The differentiation between a gastric ulcer and an ulcerating carcinoma is not always possible, and in such cases, re-examination after an interval of several days to several weeks may be necessary for a proper diagnosis. Obviously, its accuracy depends to a large extent on the experience of the observer and his ability to co-ordinate the available gastroscopic, roentgen-ray and clinical evidence. Finally, certain conditions outside the stomach may justify a gastroscopy or may make

it inadvisable or even dangerous. In such cases, for the safety of the patient, gastroscopy should be avoided.

REFERENCES

1. Moutier, F. *Traité de gastroscopie et de pathologie endoscopique de l'estomac* 347 pp. Paris: Masson et Cie, 1935.
2. Henning, N. *Lehrbuch der Gastroscopie*. 88 pp. Leipzig: J. A. Barth, 1935.
3. Schindler, R. *Gastroscopy the endoscopic study of gastric pathology*. 343 pp. Chicago: University of Chicago Press, 1937.
4. Giere, N. The present status of gastroscopy. *Minnesota Med* 21: 550-553, 1938.
5. Taylor, H. Gastroscopy: its history, technique and clinical value with report on sixty cases. *Brit J Surg* 24: 469-500, 1937.
6. Schloss, J. *Gastroscopy Internat Clin* 4: 132, 1936.
7. Borot, E. Gastroscopy observation in one hundred cases. *Am J. Digest Dis & Nutrition* 3: 533-535, 1936.
8. Benedict, E. B. Chronic gastritis: a clinical discussion based on gastroscopic examination. *New Eng J Med* 212: 468-472, 1935.
9. Chevallier, P. and Moutier, F. Les hémorragies gastriques et leur contrôle endoscopique. *Presse méd* 44: 1814, 1936.
10. Templeton, F. E. and Schindler, R. Roentgenologic and gastroscopic studies in chronic gastritis and peptic ulcer. *Am J Roentgenol*, 4: 354-362, 1939.
11. Castex, N. R. and Stocker, H. E. P. El diagnóstico de las úlceras de estómago por medio de la gastroscopia. *Presse méd argentin* 25: 1919-1940, 1938.
12. Benedict, E. B. Gastroscopic observations in neoplasm. *New Eng J Med* 214: 563-566, 1936.
13. Chevallier, R. Le diagnostic gastrosopique précoce du cancer antropylorique. *J de méd de Lyon* 17: 719-732, 1936.
14. Ilalmos, R. Gastroscopia a ranná diagnóza žaludodného karcinomu. *Bratisl Lekár Listy* 14: 73-76, 1934.
15. Schindler, R. and Giere, N. Gastric surgery and gastroscopy. *Arch Surg* 35: 712-765, 1937.
16. Schloss, J., Ettinger, A. and Pratt, J. H. Diagnosis of diseases of the stomach by gastroscopic and x-ray relief studies. *Am J M Sc* 123: 171-180, 1937.
17. Freeman, E. B. Gastroscopic study compared with other methods of diagnosis in gastric lesions. *J A M A* 112: 217-222, 1939.
18. Jankelson, I. R. and McClure, C. W. Observations on the clinical status of gastroscopy. *New Eng J Med* 219: 917-920, 1938.

MEDICAL PROGRESS

RADIATION THERAPY IN GYNECOLOGY

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RADIUM and x-ray treatment are used so extensively in gynecology that a review of their uses and purposes seems called for. Radium and the short-wave lengths of the x-ray both act on tissue in much the same way. They are never stimulating but always destructive. They act to inhibit activity of glandular structures, to inhibit mitoses in malignant growths and ultimately to cause fibrosis of tissue and arteriosclerosis. There has been much written about stimulating doses, but it is likely that radiation releases inhibiting influences and that normal function follows. Its effect on moist skin is to cause a cessation of the activity of sebaceous and sweat glands. That on ovarian function is to cause cessation of the activity of persistent and vulnerable follicles, and if the treatment is not too heavy, to allow normal follicles to recommence to function. That on inflamma-

tory tissue is to cause death of lymphocytes and a rapid softening and death of tissue cells. It is improbable that there is a direct inhibiting or killing effect on bacteria. In other words, radium and x-rays are destructive agents, and this action is used in treating gynecologic lesions.

Radium is used in two forms—the active radium salt and radon, the emanation; both, so far as gynecology is concerned, exert the same effect. Radium is the more stable, expensive and unwieldy of the two. Radon is so unstable that losses in potency must be accounted for hourly or daily; however, it is less expensive than the active salt and can be put up in many different forms, strengths and sizes. Both are employed in various types and shapes of applicators with varied densities in their walls, either to allow the use of caustic beta rays or to screen them out and permit the use of only the very short, penetrating waves of gamma radiation. So far as gynecology

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is concerned, nearly all treatment is given in heavily screened applicators, in order to keep out the caustic beta rays whenever possible. Seeds, generally of 1 to 5 millicuries strength, are used for infiltrating nodules of tumor too small to permit the use of platinum needles. In most large areas, however, platinum needles are more and more taking the place of seeds; they vary in strength from 5 to 25 mg., and are of varying lengths and thicknesses. Radiation in cavities such as the cervical canal in cases of cancer is given by means of radium or radon in hollow tubes of brass, silver, gold or platinum. These applicators may contain tubes of any strength from 25 to 500 mg. or millicuries.

X-ray treatment is now in the throes of practical experimentation with higher voltages. The old 100-kv. machine is used only for superficial treatment. Even the 200-kv. machine, which was considered a high-voltage machine a few years ago, is now thought of as having too low a voltage. The 400-kv. or 500-kv. machine is considered to be adequate by some, but the 1000-kv. one¹ is now most talked of, and great results are expected from it. Enough time has not yet passed to allow proper evaluation of these higher voltages, and it remains to be seen whether the results with the 1000-kv. machine will surpass those obtained by the 200-kv. one. Human tissue can stand just so much radiation without undergoing necrosis, and if the amount of radiation needed to cause necrosis can be delivered into the depths without too great damage to the skin by the 200-kv. machine, the 1000-kv. apparatus may do no better, except that the skin will not be injured so much. Bladder symptoms,² bowel hemorrhages, intestinal obstruction, ureteral block and extensive pelvic fibrosis must be guarded against, and if any one of the machines mentioned can prevent such calamities and yet give a lethal dose to a deep, malignant growth, it should be the one of choice. A machine is now being made which will deliver 3000 kv. Great care and extensive study must be carried out before such an agent is used on human beings, and even then its employment should be confined to experts, and not be applied in routine therapy for a long time.

There is no doubt that the experience of the last few years with x-ray treatment in addition to radium has been highly significant in the treatment of cervical lesions.³ After a long success with radium alone, the day of combined treatment has come. Its results are more satisfactory than the previous ones, and we may see a time when radium is entirely discarded. Radiation treatment is changing, and with more intelligent use of more

powerful machines and even with new types of rays greater improvement may be expected.

Vulva. Pruritus vulvae, if of the moist type and due to oversecretion of the sebaceous and sweat glands, is well treated by light doses of x-rays. The dry type seen in patients with early senile changes does not respond well to radiation; estrogenic hormones given by mouth, intramuscular injection, or in salve or suppository form are more effective, but vulvectomy may be necessary.

Leukoplakic vulvitis, a precancerous lesion, due to overgrowth of the top layers of the skin with a marked lymphocytic infiltration beneath, is not well treated by radiation. Estrogenic hormones can be used for a short time, and if a result is not obtained quickly, complete removal of the vulva should be carried out.

Kraurosis vulvae, probably the end result of leukoplakic vulvitis, a dry lesion, is not suitable for radiation. The thin, parchment-like skin with its thick underlying connective tissue, characteristically accompanied by itching, is best let alone unless the severity of the symptoms makes necessary some form of treatment, when complete vulvectomy is the operation of choice.

Most radiologists and gynecologists have learned that the heavy doses of radium or x-ray necessary to destroy vulval cancer cause extreme discomfort and pain, and have given them up. The only proper treatment is complete vulvectomy with bilateral radical dissection of both groins after the method of Basset. Taussig^{4, 5} has been America's greatest advocate of this operation, and his results surpass those of most other clinics. Vulval cancer is a disease of old women, but they are usually better surgical risks than they appear to be, and their life expectancy is longer with operation than it would be without; therefore radical surgery is justifiable. Some surgeons prefer to carry out a vulvectomy and to employ x-ray or interstitial radium treatment for the lymph nodes in the groins. This treatment is condemned, for the results are far less satisfactory than those following radical resection.

In certain cases recurrence of vulval cancer must be treated with radiation, and here it is best to use infiltration with gold seeds or platinum needles.

Clitoris. Carcinoma of the clitoris should be included under cancer of the vulva, and radical surgery—total vulvectomy and bilateral dissection of both groins—is to be preferred to any type of radiation.

Urethra. If excision of cancer of the urethra is possible, surgery is preferable to radiation. Sometimes it is not possible, and radium treatment is

instituted with the placing of platinum needles of proper length in the tumor, parallel to the urethra. The bladder is kept on constant drainage, and a massive dose of radium is given.

Cervix. Endocervicitis, once treated by moderate doses of radium in the cervical canal, is no longer so managed. Cancer of the cervix, whether squamous or adenomatous in type, whether early or advanced, is best treated by radium plus radiation by x rays. Some gynecologists prefer radium alone, often applying x-ray treatment over the lower abdomen and back, possibly adding a vaginal cone.⁵ Most gynecologists, however, prefer a combination of x-ray and radium; some give the radium first, and others the x-rays.

There is very little difference in the end results of any large series of cases, so long as they are adequately treated. In a recent report compiled by the San Francisco Gynecologic Society⁷ on the basis of statistics from ten clinics in Europe and America, there was slight variation in the results except for one clinic, and there the method used was identical with that employed in one of the other clinics, the better results possibly being explained by the predominance of early cases. In nine of the clinics with quite different methods practically the same end results were obtained. There has been a fair increase in good results from the added roentgen-ray treatment. This is accounted for by the further injury done to cancer cells already partially destroyed by radium and by fibrosis of the pericervical tissue, and not to the destruction of metastatic lymph nodes. Enough surgery has been done following radiation to demonstrate that most cancerous lymph nodes in the pelvis are not destroyed by radiation.^{6, 8} Unquestionably lymphatics are narrowed, cellular tissue is fibrosed, and cancer cells are injured, but destruction of cancer by radiation outside the field of the concentrated radium and x-ray treatment is not possible. However, fibrosis and destruction of lymph channels may easily prevent further extension of local disease. The work of Lynch,⁹ showing cancer cells in the radiated cervix subsequently removed by a total hysterectomy, and that of Taussig,⁶ who found cancerous nodes while doing pelvic dissections following radiation, offer proof that radiation does not destroy cancer outside certain areas.

The complications following treatment by radium or by radium and x rays are not uncommon and may be disastrous. The vesicovaginal fistulas seen may be due to too-vigorous treatment or to advanced disease that has penetrated to the bladder floor. Cystoscopy before radiation will ordinarily indicate the latter, and sometimes if the disease is extensive small doses are best, for if

the cancer is incurable, the patient's condition should not be made worse by too-powerful treatment. Rectovaginal fistulas are less common and are due to the same cause. For some reason they frequently heal spontaneously, but vesicovaginal fistulas practically never do so.

The necessity for careful investigation of the urinary tract² is obvious when the ureter is involved. Block of the ureter may be due either to the disease, to the disease together with swelling caused by radiation or to fibrosis following radiation. Every patient should be followed carefully by a urologist and given proper treatment, such as dilatation of the ureter or nephrostomy to prevent destruction of the kidney or ward off impending uremia.

Intestinal obstruction¹⁰ is not uncommon following x-ray treatment, and occurs most often because of the continued treatment over a piece of bowel that is fixed at some point in the pelvis. The obstruction may be in the large or small bowel. It may be a fibrous, nodular block or a long, narrow stricture. An x-ray ileitis is set up, and later fibrosis occurs. This complication may follow the use of radium, especially in the too-active treatment of cancer of the cervical stump. Here a piece of intestine may be adherent to the stump and the close proximity of the radium applicator may cause a burn and later an area of fibrosis. Obstruction is a serious complication, and the presence of intestinal cramps following radiation suggests injury to the bowel.

Swelling of the leg following radiation treatment of cervical cancer is not always due to recurrent disease in the broad ligament, and one must be sure that cancer is present before advising radiation in the form of x-ray treatment. Such swelling is often due to pelvic fibrosis and lymphatic and venous block.

In many cases, radiation in the treatment of cervical cancer fails completely because of radiation insensitivity. Greater salvage will occur when this failure to respond is recognized earlier. The effect of combined x-ray and radium treatment can be noted by biopsy of the tissue under treatment, and a fair estimate of the ultimate result can be made.¹¹ If the response is not good a poor result can be expected, and vice versa. If this poor response is recognized and if the tumor can be removed by operation, serious consideration should be given to radical hysterectomy and dissection of the pelvic lymph nodes.

In most groups of early cases of cancer of the cervix treated by x-ray and radium, the salvage is about 60 per cent, so that 40 per cent of early cases must end in death in spite of the fact that they receive proper treatment. It is probable, therefore,

that as more careful studies are carried out to determine what patients in the operable group are not responding to radiation and should therefore be submitted to a radical surgical procedure, a better than 60 per cent salvage will be effected. Surgery has its place in cervical cancer. It is a modest place, and operative cases must be carefully selected, but if radiation resistance is recognized early more cures will result by subjecting the proper patients to operation.

Taussig⁵ believes that x-rays will not kill the cancer cells in metastatic pelvic lymph nodes, and advocates dissection of the iliac, ureteral, hypogastric and obturator nodes in all early cases, especially those in which local vaginal disease can be destroyed with radiation. His end results from this operation are surprisingly good: of 11 patients with cancerous lymph nodes 3 are living and well without disease at the end of five years. The patients would surely have succumbed to the disease except for this ingenious operation. Surgery of the lymph nodes is better than radiation, and probably should be carried out.

Vagina. Cancer of the vagina, a very serious disease, should be treated like carcinoma of the cervix. External radiation through four portals should be given along with the intravaginal cone, in addition to radium needles in the center and the periphery of the tumor. The results will be poor. Fistulas, either in the bladder or rectum, will often occur. If the tumor lies in the outer vagina, dissection of the lymph nodes of the groin is essential if a good result is to be obtained. An operation of the Wertheim type can be undertaken in early cases, but it will never be so successful as radiation because of the great difficulty of removing the entire vagina. Even if it is removed, those tissues directly under the vaginal growth may be infiltrated by disease. Combined x-ray and radium treatment with the vaginal cone is the proper procedure.

Endometrium. Cancer of the endometrium is not primarily a lesion that should be treated by radiation. In some clinics radium is given to the exclusion of surgery, and the results as reported are fairly satisfactory. In most clinics the results by means of surgery are superior. Many gynecologists advise using intrauterine radium followed by x-ray treatment and then surgery, consisting of total hysterectomy—not of the radical type. Others advocate radiation in the uterine canal only, and then surgery. It has been very difficult to find an applicator that will destroy the cancer in the entire endometrial canal. Schmitz,¹² of Chicago, has devised such an apparatus. It is a Y-shaped piece of metal that contains needles

in the two arms of the Y and in the shaft; after being placed in the canal the arms can be opened so as to fit into the cornua of the uterus. This method is unsatisfactory because of the separation of the needles in the various parts of the applicator. The Pondville Hospital has been using one long gold needle that fits snugly into a Monel metal applicator 1-mm. thick, and extends from its base to its top. The uterine cavity is measured accurately before the needle is made. Applicators vary from 5 to 15 cm. in length, so that any uterine cavity can be radiated throughout by means of an applicator of proper length. With this the tumor of the endometrium can be destroyed along its entire length, but areas of tumor that penetrate into the wall of the myometrium are not affected. At Pondville the reason for using radium in the uterine cavity is to prevent extension of this disease by metastasis to the anterior or posterior vaginal walls. The presence of such nodules practically always means a fatal outcome, and little can be done except local infiltration with radon seeds. To prevent such extension the whole uterine cavity is radiated and six weeks later the patient is operated on, in the hope that the tumor will be nearly destroyed, that the lymphatics will be closed off and that any tumor cells that may be spilled in the vaginal vault at operation will be gravely injured. X-ray treatment of lymph nodes involved by this disease is not satisfactory, because they are in the aortic and renal regions and not in the pelvis. The surgery that is undertaken after x-ray treatment should include the removal of the entire cervix and both tubes and ovaries, because these areas are susceptible to metastatic involvement. Often after radiation a sterile peritonitis is found, with fibrin and adhesions all through the pelvis. The most important part of the treatment of endometrial cancer is its surgical removal. Radiation has its use in attempts to prevent metastases, especially those to the vagina, or implantation into the vaginal scar.

Fallopian Tube. Carcinoma of the fallopian tube is rare; the treatment is radical pelvic surgery.¹³ Radiation is only a secondary method of treatment, to be used after removal of the tubes, ovaries, uterus and cervix if an area of extension is found in the pelvis or if there are any evidences of pelvic metastases. The routine use of x-ray treatment is not essential.

Ovary. Cancer of the ovary is one of the most serious of all malignant lesions, and only about 9 per cent of patients with solid tumors survive for five years.¹⁴ The papillary cystadenoma of the malignant type gives about a 21 per cent five-year

curability. Surgery is the proper treatment,¹⁵ but if the tumor has become adherent, if there are areas that cannot be removed, or if there are metastatic nodules anywhere in the peritoneum, x-ray treatment should be resorted to. It should consist of rays directed against the metastases or extensions of tumor, the locations of which have been described to the roentgenologist as accurately as possible. Too many times the latter is called on to treat ovarian cancer without knowing where the radiation should be directed.

Certain types of endocrine tumors are extremely responsive to radiation, and if invasion has taken place anywhere in the peritoneal cavity, for instance, from a dysgerminoma of the ovary, this area should be treated immediately by x-ray, with some expectation of relief. Granulosa-cell tumors, supposedly radio-sensitive, may be radio-resistant, but x-ray treatment should be directed toward the metastases after they have been described to the roentgenologist.

There is no doubt that x-ray treatment prolongs life in inoperable cases of cancer of the ovary, but a cure is not effected. There are no authentic cases reported from the Massachusetts General Hospital of metastatic ovarian cancer that have been cured by x-ray treatment alone. It has made some of them operable, and following operation some of the patients have lived for a long time. By and large, x-ray treatment helps to prolong life and stop the accumulation of fluid. It is of extreme value for this reason, but radical surgery should never be avoided in the hope that x-ray treatment will furnish a proper substitute.

Benign Uterine Bleeding. In benign uterine bleeding in women near the menopause, radiation is extremely satisfactory. In any patient forty-five years of age or older who has abnormal bleeding proved by curettage to be benign, treatment by radium in the uterine cavity or by x-rays directed toward the ovaries is the one of choice. Every patient of this type who bleeds should be curetted to rule out cancer or submucous fibroids, and it is most satisfactory to place radium in the uterine cavity at that time. It is best given in the end of a long applicator that reaches the top of the fundus, so that there will be no scar in the cervix with subsequent pyometrium. Cases of bleeding after the menopause for which no reason can be found should never be treated by radium or x-ray, because of the possibility of obliterating the endometrial cavity, thus allowing the cause of the bleeding, such as a carcinoma or tumor of the ovary or tube, to be obscured. It is also possible to obliterate the cervical canal in such a way that the growth in the endometrial

cavity will continue to enlarge for some time before being discovered.

In young girls it is rarely necessary to use radiation for menorrhagia; usually hormones, such as progesterone and testosterone, will check such bleeding until the patient's own cycle has been re-established, which happens in most cases. Occasionally radium or x-ray in small doses can be used, but it is best not to treat this type of patient by radiation if it is possible to avoid it.

The effect of radium in benign bleeding cases is probably exerted on the ovary; it interferes with or destroys the follicles so that there are fewer or none left to secrete estrin. Not all the endometrium can be destroyed by a radium needle placed in the end of a long applicator in the uterine cavity, yet the bleeding does stop. Destruction of the activity of the ovary inactivates the endometrium; subsequently the latter atrophies, whereupon bleeding ceases. In about 95 per cent of cases with benign bleeding combined x-ray and radium treatment gives excellent results. There is no objection to x-ray treatment, but it is simpler, if a dilatation and curettage is to be done, to place radium at that time than to do the operation and then send the patient in for at least six x-ray treatments. It is purely a matter of convenience, not one of choice. Following radium treatment there is occasionally a moderate amount of vaginal discharge for two or three months. X-ray and radium are equally worth while, but radium is more convenient if it is available.

Fibroids. The treatment of fibroids with combined x-ray and radium should be confined to those patients who have a symmetrical, smooth tumor no larger than a grapefruit. Sending patients to the roentgenologist for treatment of fibroids by means of x-ray treatment without proper investigation of the uterine cavity and evaluation of the type of fibroid is to be condemned. Patients who have very large, rapidly growing, pedunculated or submucous fibroids, or who have a severe anemia or various other complications, should not be given x-ray treatment. The ideal tumor for radiation is one in the mid-line, smooth, without nodules, without any deviation of the uterine cavity, in a patient forty-five years of age or older but not past the menopause. There are not many fibroids that should be treated radiologically. Most should be treated surgically because of the many other pathologic lesions that are found in the pelvis at operation. Operation is to be preferred if the patient is under forty-five, because then the ovaries may be conserved, if possible, and an abrupt menopause avoided. Patients with bleeding who have passed the menopause should re-

ceive multiple curettages, and if bleeding does not cease, abdominal exploration and hysterectomy should be performed. Fibroids should never be treated with radiation after the menopause, because in most cases some other cause for the bleeding will be found, possibly an ovarian tumor, a carcinoma of the endometrium or some other serious lesion.

Endometriosis. Endometriosis is best treated by surgery. If the lesion is found to be extremely extensive and dissection of the rectum and sigmoid away from the back of the uterus practically impossible, or if there are multiple small intestinal adhesions in the pelvis, it may be well to avoid surgery. The diagnosis should be confirmed by means of biopsy, and x-ray treatment should be given to destroy the function of the ovary. The absence of the ovarian hormone will allow the endometrioma to shrink and atrophy. Radiation may be used in patients with recurrent endometriosis after a conservative operation has been performed.

Leiomyosarcoma. Leiomyosarcoma of the uterus is not satisfactorily treated with x-rays. True, there is evidence that this tumor is sensitive to radiation and will shrink under the influence of the rays, but a cure cannot be expected.

Miscellaneous. The use of x-ray treatment in patients with sterility, amenorrhea and abnormal bleeding has been discussed by Kaplan,¹⁶ Mazer and Baer¹⁷ and Rock et al.¹⁸ In certain patients with amenorrhea due to a persistent follicle cyst that controls the endometrium, destruction of the cyst by moderate doses of x-rays allows other and younger follicles to develop, which after maturing cause menstrual periods to recur. This is a logical method of treating some patients with abnormal menstrual cycles.

X-ray treatment of the pituitary gland to affect

the menstrual cycle in certain cases of dysfunction has not proved satisfactory, and should not be given until more positive evidence of successful results has been presented.

SUMMARY

The present attitude toward x-ray and radium treatment of various gynecologic disorders is presented. Methods of radiation in pelvic disease are reaching their peaks, and it is probable that there will soon be an awakening of interest in surgical procedures as opposed to radiation.

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REFERENCES

1. Dresser, R. Radiation therapy. *New Eng. J. Med.* 223:250-252, 1940.
2. Jaffe, H. L., Meigs, J. V., Graves, R. C. and Kickham, C. J. E. Uteral and renal complications of carcinoma of the cervix. *Surg., Gynec. & Obst.* 70:178-184, 1940.
3. Meigs, J. V. and Jaffe, H. L. Carcinoma of the cervix treated by roentgen-ray and radium. *Surg., Gynec. & Obst.* 69:257-266, 1939.
4. Taussig, F. J. Leucoplakic vulvitis and cancer of the vulva (etiology, histopathology, treatment, five-year results). *Am. J. Obst. & Gynec.* 18:472-503, 1929.
5. *Idem.* unpublished data.
6. Merritt, E. A. Roentgen therapy of cancer in the buccal cavity and of the cervix uteri. *Am. J. Roentgenol.* 42:418-422, 1939.
7. *Cervical cancer: details of treatment and results obtained in ten clinics of the United States and Europe.* 12 pp. A monograph compiled and printed by the Cancer Committee, San Francisco Gynecological Society, July, 1940.
8. Taussig, F. J. Effect of irradiation on normal and metastatic lymph nodes. *Am. J. Roentgenol.* 43:539-543, 1940.
9. Lynch, F. W. A five to fifteen year follow-up study of one hundred and ninety-two cervical cancers. *Am. J. Obst. & Gynec.* 22:550-559, 1931.
10. Jones, T. E. Results of prolonged irradiation for malignant conditions of pelvis. *J. A. M. A.* 103:1678-1681, 1934.
11. Warren, S., Meigs, J. V., Severance, A. O. and Jaffe, H. L. The significance of the radiation reaction in carcinoma of the cervix uteri. *Surg., Gynec. & Obst.* 69:645-647, 1939.
12. Schmitz, H. The technique of radium and roentgen treatment of carcinoma of the uterus. *Am. J. Roentgenol.* 25:364-374, 1931.
13. Parsons, L. Carcinoma of the fallopian tube. *New Eng. J. Med.* 221:367-373, 1939.
14. Meigs, J. V. Cancer of the ovary. *Surg., Gynec. & Obst.* 71:44-53, 1940.
15. Lynch, F. W. A clinical review of one hundred and ten cases of ovarian cancer. *Am. J. Obst. & Gynec.* 32:753-777, 1936.
16. Kaplan, I. I. Irradiation with small doses in the treatment of functional gynecological conditions. *Am. J. Roentgenol.* 42:731-744, 1939.
17. Mazer, C. and Baer, G. The therapeutic value of low-dosage irradiation of the pituitary gland and ovaries in functional menstrual disorders and sterility. *Am. J. Obst. & Gynec.* 37:1015-1024, 1939.
18. Rock, J., Bartlett, M. K., Gauld, A. G. and Rutherford, R. N. The effect of subcastrative roentgen therapy on ovarian physiology. *Surg., Gynec. & Obst.* 70:903-913, 1940.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27021

PRESENTATION OF CASE*

A five-month-old female child entered the hospital because of jaundice.

The infant was born at home after an easy, normal delivery. No hemorrhages, skin lesions, or jaundice were noticed at the time of birth. When the child was three days old, slight jaundice was noticed, and at this same time the urine became deep yellow and the stools clay colored. The patient did not appear ill and, so far as is known, there was no fever. She nursed well at the breast. The jaundice persisted unchanged, as did the color characteristics of the stools and urine, until the age of three months. The informant stated that at this time "the whites of the eyes cleared, the stools became yellow, and the urine less dark." Throughout this period her appetite remained good and the weight gain adequate, so that at three months she weighed 10 pounds, 7 ounces, and was eating soft-solid foods. At four months of age, and associated with the eruption of teeth, the jaundice became severer, the stools white, and the urine dark brown. At this time painful urination was first noticed, in that the child cried before the act and ceased immediately afterward. Two weeks before entry the jaundice intensified, and the patient developed a fever of 101 to 102°F. The patient was studied in another hospital and then transferred.

The family history was noncontributory. The mother had had no stillbirths or miscarriages, and four siblings were alive and well. The mother's blood Wassermann test was allegedly negative, and there was no familial history of jaundice.

On examination the patient was a fairly well-developed and well-nourished, deeply jaundiced infant who was acutely and gravely ill. Breathing was rapid and shallow, with an expiratory grunt, but no limitation of chest motion was noted. The skin was deeply jaundiced, without petechiae, and there was good tissue turgor, with fair elasticity. There was a raised, reddish-blue hemangioma approximately 2.5 by 2 cm. in the epigastric region to the left of the midline. A single olive-

sized, soft, discrete lymph node was present in the left axilla, with shotty cervical and inguinal nodes. The head was normal. The scleras and conjunctivas were markedly icteric. There was a profuse, thick, mucopurulent nasal discharge. The lips were dry and moderately pale; the mucous membranes were intact and icteric. The tonsils were reddened, and the posterior pharynx injected. The chest was fairly well developed, with a moderate amount of external beading, but no Harrison's groove. Examination of the lungs showed dullness to percussion at the right base posteriorly, with diminished breath sounds, a prolonged expiratory phase and many fine, crackling inspiratory rales over this area. The heart was enlarged to percussion; the rate was rapid, and the rhythm regular. There was a loud, blowing, systolic murmur heard all over the chest, both anteriorly and posteriorly, but loudest at the apex. The abdomen was greatly protuberant and distended, and the liver was palpable down to the iliac crest, its surface being smooth and firm, and its edge sharp. The spleen was also palpable down to the iliac crest and was slightly firm. The urethral meatus was slightly more posterior than normal, but the genitalia were otherwise normal. The tendon reflexes were hypoactive but equal; there were no meningeal signs.

The temperature was 101.2°F., the pulse 120, and the respirations 46.

Repeated examinations of the urine showed a specific gravity as high as 1.012 with a ++ test for albumin, a positive bile reaction and a persistent pyuria of moderate degree. On one occasion urine culture showed many colon bacilli. Examination of the blood showed a red-cell count of 2,490,000 with a hemoglobin of 52 per cent, and a white-cell count of 29,050 with 78 per cent polymorphonuclears, 19 per cent lymphocytes, 2 per cent monocytes and 1 per cent eosinophils. The red cells were microcytic but hypochromic, with moderate polychromatophilia. Repeated blood examinations gave essentially the same results. The venous clotting time was 8 minutes, the nonprotein nitrogen of the blood serum 43 mg. per 100 cc., the serum proteins 6.4 gm., and the icteric index 150. The carbon dioxide combining power of the blood on one occasion was 40 vol. per cent and on another 75. A lumbar puncture yielded xanthochromic fluid under increased pressure with a + test for globulin, normal sugar, and a total protein of 46 mg. per 100 cc. The fluid contained 52 red cells and 14 white cells per cubic millimeter, 9 of which were polymorphonuclears. There was no growth on culture, and a titration Hinton test in dilutions up to 1:128 was negative.

*This case is presented through the courtesy of the Children's Hospital, Boston

A throat culture on admission yielded many Type 17 pneumococci, and a blood culture grew hemolytic streptococci. Subsequent blood cultures were negative.

During hospitalization the patient ran a septic course, the temperature spiking to 105°F., and shortly after admission sulfathiazole therapy was instituted. The jaundice gradually intensified, and although the feces were usually clay colored, some were dark brown and appeared normal. By the end of the first hospital week the infant developed rather severe diarrhea, so that parenteral fluid therapy was necessary and three blood transfusions were given. The diarrhea increased to such an extent that everything was discontinued by mouth and a constant intravenous drip of aminoacid solution administered. On the fourteenth hospital day, because of microscopic hematuria, sulfathiazole was discontinued and sulfanilamide substituted. The patient died on the seventeenth hospital day. Terminally the nonprotein nitrogen of the blood rose to 68 mg. per 100 cc., and the icteric index to 300; a blood sodium was 158 milliequiv. per liter, and the blood chloride 110 milliequiv. Blood sulfanilamide determinations averaged 8 mg. per 100 cc., with a high of 22 mg. Urine sulfanilamide levels reached 104 mg. per 100 cc.

DIFFERENTIAL DIAGNOSIS

DR. JOHN D. STEWART: I might say at the outset that the most plausible diagnosis in this case is congenital malformation of the bile ducts. However, other possibilities have to be considered briefly.

Icterus neonatorum usually clears up by the end of the second week and is not associated with clay-colored stools or the presence of bile in the urine, and therefore may be dismissed from consideration. In the early history of this case erythroblastosis would have to be considered a definite possibility. However, the protracted five months' course, during which the jaundice was steadily maintained, would, according to my limited knowledge of erythroblastosis, exclude that diagnosis. The enlarged liver and spleen, of course, would go with erythroblastosis, but they would also be compatible with biliary cirrhosis based on prolonged obstruction of the bile flow. There was rather severe anemia, but despite repeated examinations of the blood there is no note that erythroblasts were found in the smear; the red cells were microcytic and hypochromic in type. Furthermore, a secondary anemia might well be found in obstructive jaundice of five months' duration with accompanying infection and malnutri-

tion. The possibility that this might be jaundice on a hemolytic basis need not, in my opinion, be considered seriously. The duration was too long and the jaundice was more or less steady and of the obstructive type, with absence of bile in the stools most of the time and with bile in the urine.

Congenital syphilis has to be considered. It would have been a serious diagnostic possibility at the outset, until excluded by the allegedly negative maternal blood Wassermann test and by the negative Hinton test in the patient's cerebrospinal fluid. The hemangioma that is described at the left of the midline in the epigastrium and the olive-sized lymph node in the left axilla might make one pause for a moment, but I see no reason to suppose from the description of this lesion that it was malignant and might have metastasized and produced obstructive jaundice and enlargement of the liver. I mention it merely in passing. To me, by far the most plausible diagnosis is congenital malformation of the bile ducts. With obstructive jaundice it would certainly be unusual to have a spleen enlarged to the extent that this spleen was. However, I do not believe that should cast too much doubt on the diagnosis. Of course, enlargement of the liver is to be expected.

Interesting points in the clinical course are the fluctuation in the level of jaundice, and the fact that bile was at times excreted into the gastrointestinal tract. The extent of bilirubinemia in any given case depends on several factors. In the first place it depends on the degree of the obstruction to the excretion of bile; secondly, on the rate at which bilirubin is excreted through the kidneys; and, finally, on the rate at which bilirubin is formed. The rate of formation of bilirubin also depends on several factors, such as nutritional intake and whether or not blood transfusions are being given. In a patient with obstructive jaundice and complete blockage of the bile flow, the serum bilirubin level may rise after a blood transfusion. The question comes up as to whether any significant amounts of bile may be excreted through the intestinal mucosa. That has never been to me a very satisfactory theory. In the adult it is safe to say that in the presence of complete obstruction to the bile flow there will be no bile in the stools. This patient may, of course, have had only partial obstruction to the common duct, a stenosis rather than obliteration. If there is stenosis of the bile ducts without complete obliteration, varying degrees of infection and inspissation of the bile and mucus might produce temporary obstruction but not a sustained complete obstruction.

Patients with complete obliteration of the bile

ducts, as shown in a very excellent study made by Ayer,¹ die of two causes, namely, malnutrition and infection. Malnutrition undoubtedly was present in this case, although on the whole I am impressed with the meagerness of the evidence pointing to it. We have a statement that there was more or less normal weight gain at one point in the history, and the physical examination indicated no extensive disturbance of malnutrition at the time the patient entered the hospital. The type of malnutrition particularly to be expected in congenital obstruction to the biliary flow, and also in the adult patient with obstructive jaundice, is interference with the absorption of fat-soluble substances, because fatty substances are taken up in the intestine with the aid of bile salts. Hence vitamin A deficiency would be one of the things to be watched for and also a deficiency of vitamin K and impairment of the clotting mechanism. We have no evidence that there was any particular disturbance in the clotting power, and there is no direct evidence of vitamin A deficiency. However, it is possible that the pathologist at his examination found distinct evidence of vitamin A deficiency in the epithelium of the renal pelvis or in the respiratory mucosa. In connection with the matter of nutrition, it interests me that this patient was treated while in the hospital with parenteral aminoacid therapy, a fact which brings up the question of administering aminoacids or a high protein diet to a patient with liver damage. There has been considerable dispute about it, but there seems to be a growing tendency to ignore the theoretical contraindications and treat patients with liver disease with a high dietary protein allowance.

This patient had sepsis for an indefinite time. There is direct evidence of infection in the urinary tract, and the child without doubt had pyelitis. The possibility that this pyelitis was based on a congenital anomaly of the urinary tract comes to mind. We have no way of deciding that question, but pyelitis in these patients is not uncommon in the absence of obstruction to urine flow. I therefore do not see that we have to postulate an anomaly of the urinary tract. There probably was a bronchopneumonia as a terminal complication. The question of whether there may have been infection in the liver also must be considered. In the reported cases this is unusual, and I see no reason to suspect that there was intra-hepatic infection in this case.

It seems to me that there was not a great deal of evidence of interference with renal function. Protracted obstructive jaundice is often associated with impairment of renal function, but in the

study that Ayer made of the renal tissue in the group of patients dying with congenital obstruction to the bile flow, significant lesions in the kidney, that is, lesions that might be associated with impaired function, were unusual. I am unable to interpret the cerebrospinal-fluid findings in this case. Whether they are related to kernicterus and changes in the brain I cannot say, but I think that is a good possibility. I see no reason to suppose there was meningitis. In conclusion I shall make a diagnosis of congenital malformation of the bile ducts with obstructive jaundice, biliary cirrhosis, pyelitis, a terminal pneumonia and bile nephrosis.

DR. HAROLD L. HIGGINS: I should like to ask Dr. Stewart if he would have explored this child if the case had come to his attention before the final episode.

DR. STEWART: In the material studied at the Children's Hospital, out of 45 cases with congenital obstruction to the flow of bile, 9 were found at operation to have lesions amenable to surgical treatment; therefore, there is a fair chance that surgical cure can be effected if the patient is in a condition warranting operation. There have been a number of patients who have grown to healthy maturity after operation for this condition.

DR. HIGGINS: The terminal episode in this case fits in very well with vitamin A deficiency. Urinary obstruction might result from epithelial debris and lead to the pyelitis. Similar epithelial debris in the bronchi probably lead to the bronchopneumonia, which would have resulted fatally sooner if the patient had not been given sulfathiazole. Treatment with vitamin A parenterally would have been distinctly in order. I should expect that there were pathological findings of rickets; the mention of a rosary is made in the history.

CLINICAL DIAGNOSES

Obstructive jaundice (? congenital atresia of bile ducts).

Bronchopneumonia

DR. STEWART'S DIAGNOSES

Congenital malformation of bile ducts, with obstructive jaundice.

Biliary cirrhosis

Pyelitis.

Terminal pneumonia

Bile nephrosis

ANATOMICAL DIAGNOSES

Bacteremia Type 17 pneumococcus and colon bacillus.

Bronchopneumonia, acute and chronic

Pyelonephritis, mild, chronic (colon bacillus).
 Atresia of extrahepatic biliary system, congenital,
 with agenesis of gall bladder and cystic duct.
 Obstructive biliary cirrhosis.
 Icterus, generalized, severe.
 Annular pancreas.
 Malformation of chordae tendineae to the aortic
 valve, congenital.
 Coarctation of aorta just proximal to ductus
 arteriosus, moderate.

PATHOLOGICAL DISCUSSION

DR. SIDNEY FARBER*: This is a complicated story, and I shall try to divide the findings into several groups. There was widespread infection in the lungs, both acute and chronic in type. That process had been going on for a number of weeks, with some organization of the exudate and a considerable amount of a fresh pneumonic process superimposed on the earlier one. Type 17 pneumococcus was found in the heart's blood at the time of autopsy, and the colon bacillus also. There was a pyelonephritis on the wane at the time of autopsy, so that I think we have every reason for assuming that both organisms had a perfect right to appear in the heart's blood. There was an otitis media with necrosis of the petrous portion of the temporal bone on one side, and a pneumococcus of the same type was cultured from that lesion. So much for the inflammatory changes. There was no evidence of meningitis — only edema and congestion of the brain.

Generalized icterus was present. The cause of this was found in an extensive malformation of the extrahepatic biliary system, which was responsible for obstructive biliary cirrhosis. The liver was considerably increased in size, very firm in consistence and deep green. The fibrosis secondary to the biliary obstruction was widespread enough to account for considerable portal obstruction. The spleen was four times the expected size for this age, and was the seat of considerable chronic passive congestion. There was a moderate degree of coarctation of the aorta just proximal to the ductus arteriosus. A second congenital vascular defect was a malformation of the chordae tendineae to the tricuspid valve, which caused a moderate degree of tricuspid insufficiency. A number of smaller and less important congenital abnormalities were found in various parts of the body.

The two most important abnormalities were the congenital malformation of the bile ducts and an unexpected malformation of the pancreas — an an-

nular pancreas. Both were studied in great detail by Dr. Margaret Huntington, until recently a member of our laboratory staff. The common bile duct was represented by a fibrous cord extending from the junction of similar fibrous hepatic ducts to the ampulla of Vater. At the lower end of the common duct there was a cystlike expansion composed of fibrous tissue without a true lining of epithelial cells. A true lumen was present only in the terminal portion of this common duct, entering into the ampulla of Vater. The cystic duct was also represented by a delicate fibrous cord, which extended to the usual site of the gall bladder. There was no lumen in any portion of this duct or at the site of the gall bladder.

The body and tail of the pancreas were of normal form, but from the head there proceeded a narrow band of pancreatic tissue that encircled the first portion of the duodenum in ring fashion. This ring, which lay just above the ampulla of Vater, produced definite stenosis of the lumen of the duodenum. The main portion of the pancreas drained through the duct of Santorini to open into the first portion of the duodenum just above the pancreatic ring. Into this duct there emptied small channels, which drained the ring portion. A duct of Wirsung could not be found.

There was no histological evidence of vitamin A deficiency. There was, however, a very marked reduction in the amount of vitamin A in the liver, determined according to the method of May and McCreary,² so that we are forced to conclude that there was a deficiency of vitamin A at the time of death. There was evidence of slight rickets on histological examination. Some years ago Dr. Mark Altschule³ studied a series of patients with congenital atresia of the bile ducts in our laboratory, and he found microscopic evidence of vitamin A deficiency in about 50 per cent.

I assume that an exploratory operation was not performed because of the pneumonic process. All patients with this general clinical picture are treated surgically, since surgical re-establishment of the extrahepatic biliary system, when possible, is the only effective treatment.

DR. STEWART: Was there any kernicterus?

DR. FARBER: No; kernicterus is essentially a pathological and not a clinical diagnosis.

A PHYSICIAN: Does a ring-shaped pancreas permit development to adult life?

DR. FARBER: Yes, about 50 cases are on record, and I think it has to be added to that very long list of causes of partial obstruction to the intestinal tract. Another case in an infant has turned up at the Children's Hospital since the one here described.

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REFERENCES

- 1 Ayer, D. Renal lesions associated with jaundice, with comments on their relations to those in the so called hepatorenal syndrome and in transfusion reactions. *Arch Path* 30 26-41, 1940
- 2 May, C. D., Blackfan, K. N., McCrory, J. F. and Allen, F. H. Jr. Clinical studies of vitamin A in infants and in children. *Am J Dis Child* 59 1167-1184, 1940
- 3 Altschule, M. D. Vitamin A deficiency in spite of adequate diet in congenital atresia of bile ducts and jaundice. *Arch Path* 29 845-856, 1935

CASE 27022

PRESENTATION OF CASE

A fifty-eight-year-old man entered the hospital complaining of precordial pain of six and a half hours' duration.

For an unstated period the patient had had slight substernal discomfort on climbing hills. At seven o'clock on the morning of admission he was seized with a severe precordial pain accompanied by a choking sensation. He described the pain as ascending diffusely from the pit of his stomach to his neck and shoulders. It abated somewhat, but four hours later returned in all its severity and radiated down both arms. The patient summoned his physician, who sent him immediately to the hospital.

The patient had had pneumonia eight years previously. The family history was irrelevant.

On examination the patient was well developed and well nourished, restless, and appeared acutely ill. He complained of substernal pain, arm discomfort and nausea. His color was ashen, with cyanosis of the lips and nailbeds. The scleras were clear; the pupils were equal and reacted to light and distance. Examination of the lungs was negative. The heart was enlarged to percussion, and on auscultation the sounds were distant and of poor quality, with a gallop rhythm at the apex. Systolic and diastolic murmurs were heard, loud at the base, faint at the apex. The aortic second sound was greater than the pulmonic. The pulses were equal and synchronous, but of poor quality and tension; the blood pressure was 200 systolic, 96 diastolic, in both arms. Examination of the abdomen was negative. Examination of the nervous system was negative.

The temperature was 98.6°F., the pulse 72, and the respirations 16.

An electrocardiographic recording showed normal rhythm with a rate of 60. There was left bundle branch block, inverted T₁, diphasic T₂ and T₄, and a normal PR interval.

That evening, eleven hours after the first attack of substernal pain, the patient suddenly died.

DIFFERENTIAL DIAGNOSIS

DR. ROBERT E. GLENDY: It is apparent at first glance that we must decide whether this man had

acute coronary thrombosis or whether he had something else. There seems to be little doubt that he did have angina pectoris on effort for an indefinite period before the onset of his acute illness. The description of the initial symptoms of the final episode might, if not subjected to too much scrutiny, be accepted as fairly typical of coronary thrombosis. It is not quite clear from the wording whether the onset of the pain was gradual, with progressive increase in severity, as one might expect with coronary thrombosis, or whether it was very sudden, reaching its maximum intensity quickly, as might be the case in dissecting aneurysm of the aorta. At first the pain radiated only to the neck and shoulder, then abated, and later radiated to the arms. This sequence of events does not seem to be of any particular significance in making a diagnosis of coronary thrombosis, whereas it is possible that if he had dissecting aneurysm the initial pain marked the initial rupture and dissection within the coats of aorta, and the subsequent spread to the arms occurred when the proximal dissection involved one or both of the coronary orifices. The reason I raise this point is that it is rather unusual in dissecting aneurysm to have radiation of pain into the arms except, perhaps, when the coronary circulation has been involved by proximal dissection.

The past history affords no relevant information. Physical examination showed an acutely ill, ashen man with cyanosis of the lips and nailbeds. The degree of collapse described may occur in various cardiovascular emergencies. A blood pressure of 200 systolic, 96 diastolic certainly does not rule out coronary thrombosis, but it is quite against it. Were there any other blood-pressure determinations?

DR. TRACY B. MALLORY: That is all we have.

DR. GLENDY: The high blood pressure suggests the possibility of dissecting aneurysm of the aorta, because in this condition the pressure may be very high, even with an extreme degree of collapse. The negative findings in the lungs are significant, and I think they favor the diagnosis of dissecting aneurysm rather than any serious acute myocardial damage. Both the normal respiratory rate in the absence of dyspnea and orthopnea and the fact that the pulmonic second sound was not abnormal seem to bear this out. The enlargement of the heart certainly affords no etiologic clue, except that perhaps heart disease was present. The distant heart sounds, which were of poor quality, and the gallop rhythm likewise do not offer any important differential features. Incidentally, the term "gallop rhythm" is usually reserved for pulse rates above the normal range, but it is possible, I suppose, for the same mechanism to be in operation

at the slower rates of 72 and 60 when the heart is under considerable strain.

The muffled heart sounds I do not know exactly how to interpret. They may be due to weakening of the myocardium or possibly to an accumulation of fluid, which would undoubtedly, in this case, be blood in the pericardial sac.

The systolic and diastolic murmurs, maximal at the base of the heart, are, I believe, of considerable importance in arriving at a diagnosis. We have no previous history of rheumatic infection or syphilis, and nothing except the murmurs to suggest either of these conditions at this examination. The aortic second sound was described as present and greater than the pulmonic second sound. This certainly seems to be against any marked organic deformity or rigidity of the aortic valve that might be present with rheumatic or syphilitic heart disease.

What else might be responsible for such murmurs? Calcareous aortic-valve disease, possibly; but I think this is unlikely for the same reasons that I have just stated for rheumatic and syphilitic heart disease. The murmurs may have been pericardial in origin if there was fluid accumulating in the pericardial sac. Finally, the murmurs may have been, and I believe were, due to changes occurring in the aortic ring from dissecting aneurysm. We have no previous examination on which to base this conclusion, but such murmurs do appear fairly often in acute dissecting aneurysm owing to altered conditions in the aortic ring, and the mechanism is said to be due to the same factors that produce the murmurs in arteriovenous aneurysm, that is, the usual lumen of the aorta representing one vessel and the dissected portion the other, connected by a slit or rent in the intima.

The examinations of the abdomen and nervous system are reported as negative. There is no mention made of the peripheral pulses in the legs and feet. Do you know whether any observations were made?

DR. MALLORY: None were recorded.

DR. GLENDY: I am not surprised, because several years ago in reviewing 20 cases of dissecting aneurysm the clinical information, particularly in regard to peripheral pulsations, was very meager. I think that was largely due to the fact that when such a patient came in he was so ill that the doctors did not examine him completely, postponing it until a later time, which never came because the patient died. These people do not linger long.

The electrocardiogram showed left bundle-branch block, indicating coronary disease, but the disturbances in the T waves might occur with block alone, and I do not believe that there is any-

thing in the tracing to indicate an acute myocardial process; this, again, would be against coronary thrombosis. I believe that this man had hypertensive coronary heart disease with cardiac enlargement, angina pectoris, and an acute dissecting aortic aneurysm, with at least proximal dissection and possibly distal dissection, the former involving the mouths of the coronary vessels; his sudden death was probably the result of rupture of this aneurysm into the pericardial sac or the mediastinum.

DR. MALLORY: Are there any alternative suggestions? Dr. Glendy has made his case very convincing.

DR. MILTON H. CLIFFORD: I can add nothing to the history. Very little could be found out about the past. The patient had seen a physician about six years before admission, but unfortunately no record of the blood pressure was made. The patient had always felt very well. When first seen he was not in any particularly acute shock, although a bit ashen. The blood pressure at that time was 170 systolic, 80 diastolic. It is evident that the shock must have increased greatly by the time he reached the hospital.

DR. PAUL D. WHITE: Dr. Mallory has handed me the electrocardiograms, and as Dr. Glendy stated, there is no evidence of any massive myocardial involvement, simply that of coronary heart disease, a clear-cut, well-marked left bundle-branch block, with T waves and ST segments in keeping with chronic coronary disease. There may be a normal-appearing electrocardiogram in the three clinical leads in the first few hours or days of coronary thrombosis, although there usually is an early change. If there had been massive enough myocardial involvement to kill the patient so quickly, one would expect more change.

DR. WILLIAM B. BREED: Is there anything in the electrocardiogram to suggest massive pulmonary infarction?

DR. WHITE: With bundle-branch block it may be impossible to detect complications. One cannot tell so much about what is going on as in normal complexes because the QRS and T waves in bundle-branch block are already greatly deformed. I cannot answer with certainty, but I should expect some change in the T waves, even in the presence of bundle-branch block, if massive pulmonary infarction were present. We have not, however, happened to encounter such a combination.

DR. BREED: With the story of pain in the chest, in spite of the negative chest examination at entrance, one must bring up the question of pulmonary embolism although I do not believe one can be definite. It should be considered.

DR. ROBERT S. PALMER: Rarely also one sees rup-

ture of the heart after coronary thrombosis. When would such rupture take place?

DR. WHITE: In going over a series of autopsies a few years ago we found that the average time of rupture of the heart after infarction was on the sixth day; of 16 cases, it occurred before the sixth day in 6, on the sixth day in 4, and after the sixth day in 6.

DR. EDWARD F. BLAND: We had 1 case in which it occurred in four or five days.

DR. WHITE: Have we seen any rupture within twenty-four hours, Dr. Mallory?

DR. MALLORY: I remember one that occurred in forty-eight hours. I think it has been reported within twenty-four.

CLINICAL DIAGNOSES

Coronary occlusion.

Myocardial infarction.

DR. GLENDY'S DIAGNOSES

Hypertensive, coronary heart disease.

Cardiac hypertrophy.

Angina pectoris.

Dissecting aneurysm of the aorta, with proximal dissection involving the coronary orifices and rupture into the pericardium or mediastinum

ANATOMICAL DIAGNOSES

Dissecting aneurysm of ascending aorta, with rupture.

Media necrosis cystica aortica.

Hemopericardium.

Cardiac hypertrophy.

Pheochromocytoma of the adrenal gland.

Nephrosclerosis.

PATHOLOGICAL DISCUSSION

DR. MALLORY: The post-mortem examination confirms Dr. Glendy's predictions. There was a dissecting aneurysm of rather short extent. A horizontal tear was found in the intima of the aorta about 2 cm. above the aortic valve. There was dissection backward to the annulus fibrosus and the mouths of the coronary arteries, and forward as far as the arch of the aorta, where it stopped abruptly. There was no dissection of the

abdominal or thoracic aorta. The aneurysm had ruptured externally into the pericardium, and since nearly 700 cc. of blood was present in the pericardial sac, it is reasonable to assume that the immediate mechanism of death was cardiac tamponade. The points of internal and external rupture were very near to each other.

DR. WHITE: Was the arch calcified?

DR. MALLORY: Yes; there was some calcification.

DR. WHITE: I wonder if the calcification stopped further dissection.

DR. MALLORY: It was limited to the intima, and since the plane of dissection was in the media, I should not think so.

DR. WHITE: I was thinking of the case that we saw last year with a rigid descending aorta, senile ectasia and a dissecting aneurysm of the ascending aorta; it was difficult or impossible for the dissection to continue down to the abdominal aorta.

DR. MALLORY: Occasionally in the abdominal aorta, calcification does extend deeply into the media and therefore might block dissection. In sections from most of this aorta there was no evidence of media necrosis cystica, but in the ascending aorta, the region of the dissection, there was clear evidence of it. I think that the dissection was limited to the portion of the aorta involved by the media necrosis cystica. There was considerable cardiac hypertrophy,—the heart weighed 550 gm,—which would suggest that the hypertension had been present for a significant period of time. The coronary arteries and the aortic valve were entirely normal.

One complete surprise of the autopsy was a tumor of the adrenal gland, centrally placed and small—about 1 cm. in diameter. This was a pheochromocytoma and may or may not have been responsible for the hypertension. There was also an ordinary nephrosclerosis.

DR. WHITE: You say that the coronary arteries were normal. I suppose there must have been some involvement of the smaller branches, unless this bundle-branch block could be attributed to an old infectious process, which would be much less likely.

DR. MALLORY: There was no gross involvement of the coronary arteries

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of

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THE NEW HAMPSHIRE MEDICAL SOCIETY
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SUBSCRIPTION TERMS: \$6.00 per year in advance, postago paid, for the United States; Canada, \$7.04 per year; \$8.32 per year for all foreign countries belonging to the Postal Union.

MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

THE MOST ANCIENT OF THE HEALING ARTS

AN Egyptian sculpture depicts King Akh-en-Aton and Queen Nefertiti (1375-1358 B. C.) holding out their children to be blessed by the healing hands of the Sun God. The king was one of the earliest Monotheists, and his god was the sun. Two thousand years before medicine could be called a science by any stretch of the imagination, physical therapy was being successfully employed by the Egyptians. In recent years there has been great change and advance in the methods and agents used in the treatment of many different diseases and lesions. The applicability and worth of physical therapy in many disorders seem to have been so forgotten by the regular school of medicine that its practice is becoming associated with

certain cults. This situation is unfortunate for medicine and for its charges.

The prescription and administration of physical therapy are not the prerogatives of any specialty; they belong to general medicine. Physical therapy is as important in the treatment of cardiovascular diseases, disorders of the endocrine glands and chronic arthritic diseases as it is in neural disorders and orthopedic conditions. It is one of the most effective weapons of preventive medicine; it is the universal stimulator of convalescence. Thirty per cent of our countrymen drafted in World War I were rejected because of physical defects—and without doubt a still higher figure would hold true among women. The same percentage is anticipated, and, indeed, is being found, in the present conscription. Because the rehabilitating powers of physical therapy were demonstrated beyond cavil in the last war, it is safe to say that this disquieting number would be cut in halves if the medical profession could "sell" to American youth the simple prescriptions of preventive physical therapy.

What shall we do about the existing neglect of this most ancient art of healing? With his usual acuity Dr. Alan Gregg,* of the Rockefeller Foundation, has touched the sorest spot in the present situation: "A curious phenomenon in American medicine is the deft elimination of much reference to physical therapy, mindful, I suppose of the abuses imputed to osteopaths and chiropractors. . . . Thus protected our graduates angrily complain of competition from those whose knowledge it is tabu to acquire. The current unabashed ignorance of physical therapy in the country leaves it an excellent opportunity for development in American medicine." Dr. Gregg is correct—the fault lies in the medical schools. The first-rate schools are as guilty, if not guiltier, than the poor ones. With a few exceptions, hospital clinics of physical therapy are travesties on the name. Medical education is the heart of medicine, and physical therapy represents an essential artery of health. Can we not prevent it from becoming sclerotic?

*Gregg, A. Addenda to the agenda for the decade 1940-1950. *J. A. M. A.* 114:1139-1141, 1940.

There are a few voices crying in this wilderness of neglect. The Council on Physical Therapy of the American Medical Association is the loudest and most effective, but thus far the practical results have been meager except for hindering the sale of expensive and largely valueless apparatus to physicians in general practice. There is the "still small voice" of the Committee on Physical Therapy of the Massachusetts Medical Society, but physicians have turned an almost deaf ear to the five-year-old proddings of the committee and its offerings of postgraduate courses, exhibits and demonstrations. The medical schools, if they will, can convince their students of the importance of physical therapy and can provide the most efficient "hearing aid" for their graduates. This is one branch of medicine in the United States the rank and accomplishment of which compare most unfavorably with its dignity and effectiveness in other countries. "The sense of sin is the starting point of progress." It is high time we started.

It is a satisfaction to report that the Harvard Medical School, in co-operation with the Massachusetts General Hospital, has already taken steps to improve the teaching of physical therapy by the appointment of a medical physiotherapist as an assistant in medicine; he is also in charge of the newly equipped Department of Physical Therapy at the Massachusetts General Hospital.

THE MODERN DRUGSTORE

In a recent number of *Hygeia* appears an article that is heartening in indicating the increasing educational requirements and competence of professional pharmacists. The marketing of prescriptions to the laity is still a function of the so-called "drugstore," which, in reality, has become a department store. A survey of the prescription business, recently made, tabulates the returns received from 345 drugstores, distributed in such a way as to make an adequate sample of the country. In 1939, less than twelve per cent of the total revenue in these stores came from prescriptions. The average price for prescriptions was 91 cents each; the outlay for other items averaged 30 cents each. The former did not include the many pur-

chases of medicines not made on prescription, and their high unit cost is probably one reason for the appalling amount of self-medication that goes on.

Presumably the cost of the prescription could be somewhat reduced by an increase in volume, since this is accompanied by an increase in prescription stock that is far less than that of the prescription sales. Furthermore, if one classifies the stores, either geographically or in relation to the size of the towns in which they are located, it appears that adequate profits are available to the drugstore regardless of these factors. It is apparent from the above-mentioned analysis that an increased use of prescriptions by doctors would make it possible to reduce their cost.

We, as doctors, are partly to blame for this situation. For a small temporary saving to the patient, we tell him "to buy a bottle of aspirin" or "to get some quinine." To be sure, it would cost the patient more if we wrote a prescription for these things until the practice was so general, and the volume of prescription business so large, that the pharmacist could afford to do away with the department-store end of his business. However, the basic difficulty lies with neither the pharmacist nor the doctor but primarily with the public. One pharmacist, who does a large prescription business, states that many of his regular clients demanded that he put in a lunch counter and soda fountain so that they would have something to do while waiting for their prescriptions to be filled. He finally succumbed, with great profit to himself.

The great problem of modern economics is that of distribution. We have attacked quality, advertising and production fairly successfully, but the problem of distribution remains to be solved in pharmacy as in many other spheres of merchandising.

MEDICAL EPONYM

FOWLER'S SOLUTION

Fowler's Solution owes its name to Thomas Fowler (1736-1801), who in 1786 published an essay entitled "Medical reports of the effects of arsenic in the cure of agues, remitting fevers and periodic headaches." This was printed by J. John-

son, of London, in 1786. In his preface, the author, after calling attention to the fact that a patent medicine—Tasteless Ague and Fever Drops—had acquired some reputation in the country and had been found efficacious, says:

In the Beginning of October, 1783, Mr. Hughes, the Apothecary to the Infirmary, (whose Industry, Attention and Abilities in his professional Line, justly merit Applause) informed the Author, that he had tried to imitate the Ague Drops, and, from a number of Experiments, had so far succeeded (his Medicine having produced similar Effects) that he was convinced they were a Preparation of Arsenic.

In Consequence of this general Intimation, the Author of these Sheets consulted Lewis's Materia Medica upon Arsenic, and agreeable to his pharmaceutic History of that Article, he dissolved a small Portion of the white Sort in a Solution of the fixed vegetable Alkali. On trying and comparing the Effects of this Solution, with those of the Patent Ague Drops, he found the Medicine to be similar, but that the former was too Strong: he therefore diluted the Solution, by doubling the Proportion of Water, and then comparing their Effects, found the Medicines nearly of an equal Strength.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

COARCTATION OF THE AORTA IN PREGNANCY

Mrs. M. T., a thirty-two-year-old primipara, was seen on August 9, 1932, in the first month of pregnancy.

The family history was unimportant. The patient gave a history of scarlet fever, measles, pneumonia and mumps in childhood. She had had no serious illness after fifteen years of age. Four or five years before examination she had a period of excessive fatigue, when she was put to bed to rest for a week or two. At this time the systolic blood pressure was found to be 180, but it had not been taken since. Catamenia began at fourteen, were regular with a twenty-eight-day cycle and lasted about four days. The last period began on June 28, making the expected date of confinement April 4, 1933.

At the time of the first examination the patient had no symptoms. General physical examination was negative except for a systolic blood pres-

sure of 170 and a loud blowing systolic murmur, loudest at the base. The urine was normal. The patient was referred at once to a cardiologist, whose opinion was as follows:

The blood pressure is 180 systolic, 100 diastolic, in the arms; the arteries in the legs are barely palpable, and the pulsations so faint that I cannot take the pressure by ordinary measures. The heart has a very loud systolic murmur, loudest at the base, where it is transmitted upward; it can be heard very clearly down the back. These findings are associable with a congenital malformation in the aorta somewhere below the point where the left subclavian comes off. The abbreviated diagnosis is coarctation of the aorta, but I think the trouble is further down the aorta than this diagnosis strictly suggests. The x-ray examination is somewhat unsatisfactory because the patient is so young that the arteries do not show clearly. Nevertheless, the films show a change in the outline of the descending aorta. There is no evidence of nephritis or other disease.

Of course, no one knows what influence this condition may have on pregnancy. There is justification, however, in treating the case as one would a Class I cardiac patient. I have therefore prescribed the usual regime, and asked her to report at regular intervals.

The only thing that enters my mind is the possibility that the pregnancy may be interfered with because of the abnormally low blood supply to the lower part of the body, which might interfere with the development of the fetus. Pregnancy is supposed to be rare among patients with coarctation of the aorta because their bodies are ill nourished below the point of narrowing and their internal genitalia may be poorly developed. But this patient, unlike many of those with coarctation of the aorta, seems to be symmetrically developed.

From this time on the patient was kept under close observation by both the obstetrician and the cardiologist, and her activities were restricted exactly as if she had been a Class I cardiac patient. The pregnancy progressed uneventfully until December 30, when she reported that she had not felt any fetal motion for a week. The uterus was the size of a six and a half months' pregnancy, there appeared to be an excess of fluid, and no fetal heart could be heard. X-ray examination showed a moderate hydramnios and a probably dead fetus. From this time on the uterus did not enlarge, and on March 9 the patient went into labor and delivered a stillborn, macerated fetus. There was no obvious cause for the intrauterine fetal death. The blood pressure had been persistently elevated throughout the pregnancy, at times being 200 systolic. The puerperium was uncomplicated.

Ten months later the patient became pregnant for the second time. She was again kept under close observation by the cardiologist and treated as a patient with organic heart disease. The pregnancy was entirely uneventful; the patient went into spontaneous labor at term and was delivered normally of a baby boy weighing 9 pounds,

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

11 ounces. The convalescence was uncomplicated. About two and a half years later the patient became pregnant for the third time, and again went through her pregnancy without complications and was delivered normally at term of a baby girl weighing 7 pounds, 3 ounces.

At the present time, four years later, this patient is forty years old, is in the eighth month of her fourth pregnancy, has a systolic blood pressure of 170 or 180 but is otherwise entirely well. She has been kept on the same cardiac regime as in the other pregnancies, and a normal termination of the pregnancy is expected.

Comment. This case is reported because of its rarity and to show that coarctation of the aorta in no way contraindicates pregnancy or pelvic delivery.

MEDICAL-COSTS INSURANCE

To The Editor. The following correspondence will undoubtedly be of interest to the members of the Massachusetts Medical Society.

WALTER G PHIPPEN, M.D.

* * *

Dear Dr. Phippen

Following the publication in the *New England Journal of Medicine* of the votes of the Council of the Massachusetts Medical Society in regard to the development of a prepayment insurance plan to cover the costs of medical care, individual members of the Society and the lay press reached the erroneous conclusion that the Society was endeavoring to develop control over all medical service plans.

Since then the lay press has frequently asked the White Cross and Medical and Surgical Associates if there was a conflict between the Massachusetts Medical Society and the White Cross. Both the organizations asked have taken pains to make it clear to the press that although the preliminary synopsis approved by the Council might be given a monopolistic interpretation and suggest a conflict, they were sure that any ambiguity which appeared in the preliminary synopsis would be eliminated in the final draft.

Despite this, articles have appeared several times in the lay press suggesting that there would be a conflict between the Massachusetts Medical Society and other groups that offer medical service on a prepayment basis. The most recent one noted by us appeared in the *Quincy Tribune*. All such articles seem to us to be very unfortunate, and we fear that they may interfere with the development of constructive plans for the delivery of medical service on a prepayment basis.

We can assure you that neither the White Cross nor Medical and Surgical Associates has instigated or authorized anyone connected with the management of either to prepare such an article. Furthermore, we believe that several plans should be developed for the delivery of medical care on a prepayment basis, so that by trial and error the best plan or plans for the public welfare may be secured.

We fear that suspicion still exists in some quarters that the Massachusetts Medical Society is endeavoring to create a monopoly, and we respectfully suggest that you make an announcement in the *Journal* similar to the one which you have made to one of us personally, namely, that the Society has no idea of trying to establish a monopoly.

As a step toward clarifying the situation and eliminating unfounded suspicions we shall be glad to have you publish this letter in the *New England Journal of Medicine*.

Sincerely yours,

Channing Frothingham, *Chairman*,
MEDICAL AND SURGICAL ASSOCIATES

73 Tremont Street,
Boston

Dear Dr. Frothingham

Your letter of recent date is at hand. Inasmuch as several members of the Society have written me in regard to the appearance of articles in the lay press concerning prepayment plans for medical care, I am very glad to publish your letter disclaiming responsibility for these unfortunate publications.

May I take this opportunity to say what has been said before, namely, that the draft of the enabling act presented by Dr. Lanman's committee was merely a preliminary draft. You may remember that I asked that no action be taken by the Council but that the committee desired constructive criticism. The criticisms so received have been duly considered by the committee and will be presented at the next meeting of the Council in February.

So far as we have been able to determine from legal counsel of the Massachusetts Medical Society, our bill does not interfere with any existing plan. The Massachusetts Medical Society believes that any plan that it sponsors should comply with the laws governing insurance in Massachusetts and that it have supervisory control through properly appointed general and local committees of any plan so established. I am sure it does not contemplate a monopoly.

Very sincerely,

Walter G. Phippen, *President*,
MASSACHUSETTS MEDICAL SOCIETY

31 Chestnut Street,
Salem, Massachusetts

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning January 12.

MIDDLESEX EAST

Tuesday, January 14, at 4 15 p.m., at the Melrose Hospital, Melrose. The Clinical Recognition of the Types of Jaundice and Recent Advances in Their Treatment. Instructor Franz Ingelfinger. Walter H. Flanders, *Chairman*.

MIDDLESEX SOUTH

Tuesday, January 14, at 4 00 p.m., at the Cambridge Hospital, Mt. Auburn Street, Cambridge. Pediatric Case Discussions. Instructor Warren R. Sisson. Dudley Merrill, *Chairman*.

NORFOLK

Thursday, January 16, at 8:30 p.m., at the Norwood Hospital, Norwood. Dermatitis and Eczema. Instructor: Bernard Appel. Hugo B. C. Riemer, *Chairman*.

NORFOLK SOUTH

Monday, January 13, at 8:30 p.m., at the Quincy City Hospital, Quincy. Diagnosis and Treatment of Minor Lesions of Rectum and Anus. Instructor: Franklin G. Balch, Jr. David L. Belding, *Chairman*.

SUFFOLK

Thursday, January 16, at 4:30 p.m., in John Ware Hall, Boston Medical Library. Therapeutic Uses of Preparations of Endocrine Glands: Thyroid gland, pituitary gland, ovary, testis and adrenal cortex. Instructor: William T. Salter. Reginald Fitz, *Chairman*.

DEATHS

CRAWFORD — JOSEPH W. CRAWFORD, M.D., of North Adams, died November 7. He was in his sixty-ninth year.

Dr. Crawford received his degree from the Hahnemann Medical College and Hospital of Philadelphia in 1900. He was a fellow of the Massachusetts Medical Society and the American Medical Association, and also held membership in the Radiological Society of North America. He was on the staff of the North Adams Hospital.

CURRAN — CHARLES H. CURRAN, M.D., of Springfield, died September 10. He was in his fifty-first year.

Dr. Curran received his degree from the University of the City of New York Medical Department in 1886. He was a former member of the Massachusetts Medical Society.

FITZPATRICK — FRANCIS J. FITZPATRICK, M.D., of Somerville, died January 2. He was in his sixtieth year.

Born in Charlestown, he attended Boston College and received his degree from the College of Physicians and Surgeons in Boston in 1928. Dr. Fitzpatrick was a member of the Somerville Board of Public Welfare at the time of his death. He was a member of the Massachusetts Medical Society and the American Medical Association.

PAGE — JOSEPH G. E. PAGE, M.D., of Southbridge, died December 28. He was in his seventieth year.

Born in Soral, Quebec, he attended St. Hyacinthe College and Laval University, Quebec, and received his degree from the University of Montreal Faculty of Medicine in 1895. He served as a member of the Southbridge Board of Health for a number of years and was formerly associate medical examiner of that district. Dr. Page was a member of the Massachusetts Medical Society and of the American Medical Association.

His widow, a son, a daughter and a grandchild survive him.

MISCELLANY

GREATER BOSTON COMMUNITY FUND

Dr. Earle M. Chapman will head the Physicians' Group of the Professional Division of Industry and Finance in the Greater Boston Community Fund's 1941 Campaign to raise \$4,883,000 between January 18 and February 5.

The ten committees, each under the direction of a vice-chairman, are composed as follows:

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J. M. Baty, vice-chairman. Committeemen: R. C. Eley, M. N. Fulton, Harold Freedman, Theodore Bennett.

Walter Bauer, vice-chairman. Committeemen: Ralph Adams, Henry Beecher, Oliver Cope, Reed Harwood, Carroll Larson, Alfred Ludwig, Champ Lyons, John Stewart, Hans Waite, J. W. Zeller.

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The Hospital Group of the Institutions' Division of Industry and Finance is headed by Dr. Norbert A. Wilhelm, superintendent of the Peter Bent Brigham Hospital. He will be assisted by over a hundred physicians who are members of the hospital staffs of Greater Boston.

CORRESPONDENCE

STATE MENTAL HOSPITALS, LISTED
ACCORDING TO CITIES AND TOWNS

To the Editor: Following is a list of the cities and towns within the Commonwealth; opposite the name of each is indicated the mental hospital to which patients suffering from psychosis should be referred whenever hospitalization becomes necessary. The list is derived from a revision of hospital districts within the State which became effective October 1, 1940, and was necessitated chiefly by the fact that certain hospitals were receiving a greater number of admissions than could be properly accommodated.

Committing courts were advised of the change at the time. It now appears, however, that the information has not reached many physicians in the Commonwealth.

CLIFTON T. PERKINS, *Commissioner,*
Department of Mental Health.

100 Nashua Street, Boston.

* * *

Millville	Worcester	Grafton	Stoneham	Middlesex	Worcester
Milton	Norfolk	Medfield	Stoughton	Norfolk	Foxborough
Monroe	Franklin	Northampton	Stow	Middlesex	Worcester
Monson	Hampden	Worcester	Sturbridge	Worcester	Grafton
Montague	Franklin	Northampton	Sudbury	Middlesex	Westborough
Monterey	Berkshire	Northampton	Sunderland	Franklin	Northampton
Montgomery	Hampden	Northampton	Sutton	Worcester	Worcester
Mount Washington	Berkshire	Northampton	Swampscott	Essex	Danvers
			Swansea	Bristol	Taunton
Nahant	Essex	Danvers	TAUNTON	Bristol	Taunton
Nantucket	Nantucket	Taunton	Templeton	Worcester	Gardner
Natick	Middlesex	Westborough	Tewksbury	Middlesex	Worcester
Needham	Norfolk	Medfield	Tisbury	Dukes	Taunton
New Ashford	Berkshire	Northampton	Tolland	Hampden	Northampton
NEW BEDFORD	Bristol	Taunton	Topsfield	Essex	Danvers
New Braintree	Worcester	Worcester	Townsend	Middlesex	Gardner
New Marlborough	Berkshire	Northampton	Truro	Barnstable	Taunton
New Salem	Franklin	Gardner	Tyngsborough	Middlesex	Worcester
Newbury	Essex	Danvers	Tyringham	Berkshire	Northampton
NEWBURYPORT	Essex	Danvers			
NEWTON	Middlesex	Westborough			
Norfolk	Norfolk	Foxborough	Upton	Worcester	Grafton
NORTH ADAMS	Berkshire	Northampton	Uxbridge	Worcester	Grafton
North Andover	Essex	Danvers			
North Attleboro	Bristol	Foxborough and Taunton	Wakefield	Middlesex	Worcester
North Brookfield	Worcester	Worcester	Wales	Hampden	Worcester
North Reading	Middlesex	Worcester	Walpole	Norfolk	Foxborough
NORTHAMPTON	Hampshire	Northampton	WALTHAM	Middlesex	Westborough
Northborough	Worcester	Westborough	Ware	Hampshire	Worcester
Northbridge	Worcester	Grafton	Wareham	Plymouth	Taunton
Northfield	Franklin	Northampton	Warren	Worcester	Worcester
Norton	Bristol	Foxborough and Taunton	Warwick	Franklin	Gardner
Norwell	Plymouth	Taunton	Washington	Berkshire	Northampton
Norwood	Norfolk	Medfield	Watertown	Middlesex	Westborough
			Wayland	Middlesex	Westborough
Oak Bluffs	Dukes	Taunton	Webster	Worcester	Grafton
Oakham	Worcester	Worcester	Wellesley	Norfolk	Medfield
Orange	Franklin	Gardner	Wellfleet	Barnstable	Taunton
Orleans	Barnstable	Taunton	Wendell	Franklin	Gardner
Otis	Berkshire	Northampton	Wenham	Essex	Danvers
Oxford	Worcester	Grafton	West Boylston	Worcester	Worcester
			West Bridgewater	Plymouth	Foxborough and Taunton
Palmer	Hampden	Worcester	West Brookfield	Worcester	Worcester
Paxton	Worcester	Worcester	West Newbury	Essex	Danvers
PEABODY	Essex	Danvers	West Springfield	Hampden	Northampton
Pelham	Hampshire	Northampton	West Stockbridge	Berkshire	Northampton
Pembroke	Plymouth	Taunton	West Tisbury	Dukes	Taunton
Pepperell	Middlesex	Gardner	Westborough	Worcester	Westborough
Peru	Berkshire	Northampton	WESTFIELD	Hampden	Northampton
Petersham	Worcester	Gardner	Westford	Middlesex	Gardner
Phillipston	Worcester	Gardner	Westhampton	Hampshire	Northampton
PITTSFIELD	Berkshire	Northampton	Westminster	Worcester	Gardner
Plainfield	Hampshire	Northampton	Weston	Middlesex	Westborough
Plainville	Norfolk	Foxborough	Westport	Bristol	Taunton
Plymouth	Plymouth	Taunton	Westwood	Norfolk	Medfield
Plympton	Plymouth	Taunton	Weymouth	Norfolk	Medfield
Prescott	Hampshire	Worcester	Whately	Franklin	Northampton
Princeton	Worcester	Worcester	Whitman	Plymouth	Taunton
Provincetown	Barnstable	Taunton	Wilbraham	Hampden	Worcester
			Williamsburg	Hampshire	Northampton
QUINCY	Norfolk	Medfield	Williamstown	Berkshire	Northampton
			Wilmington	Middlesex	Worcester
Randolph	Norfolk	Medfield	Winchendon	Worcester	Gardner
Raynham	Bristol	Taunton	Winchester	Middlesex	Worcester
Reading	Middlesex	Worcester	Windsor	Berkshire	Northampton
Rehoboth	Bristol	Taunton	Winthrop	Suffolk	Danvers
REVERE	Suffolk	Danvers	Woburn	Middlesex	Worcester
Richmond	Berkshire	Northampton	WORCESTER	Worcester	Worcester
Rochester	Plymouth	Taunton	Worthington	Hampshire	Northampton
Rockland	Plymouth	Taunton	Wrentham	Norfolk	Foxborough
Rockport	Essex	Danvers			
Rowe	Franklin	Northampton	YARMOUTH	Barnstable	Taunton
Rowley	Essex	Danvers			
Royalston	Worcester	Gardner			
Russell	Hampden	Northampton			
Kutland	Worcester	Worcester			
SALEM	Essex	Danvers			
Salisbury	Essex	Danvers			
Sandisfield	Berkshire	Northampton			
Sandwich	Barnstable	Taunton			
Saugus	Essex	Danvers			
Savoy	Berkshire	Northampton			
Scituate	Plymouth	Taunton			
Seekonk	Bristol	Taunton			
Sharon	Norfolk	Foxborough			
Sheffield	Berkshire	Northampton			
Shelburne	Franklin	Northampton			
Sherborn	Middlesex	Westborough			
Shirley	Middlesex	Gardner			
Shrewsbury	Worcester	Worcester			
Shutesbury	Franklin	Northampton			
Somerset	Bristol	Taunton			
SOMERVILLE	Middlesex	Westborough			
South Hadley	Hampshire	Northampton			
Southampton	Hampshire	Northampton			
Southborough	Worcester	Westborough			
Southbridge	Worcester	Grafton			
Southwick	Hampden	Northampton			
Spencer	Worcester	Worcester			
SPRINGFIELD	Hampden	Northampton			
Sterling	Worcester	Worcester			
Stockbridge	Berkshire	Northampton			

RESTORATION OF LICENSE

To the Editor: The license of Dr. Anthony P. Carogana, 672 Broadway, Chelsea, Massachusetts, which was revoked on July 11, 1940, was restored by the Board of Registration in Medicine on December 19, 1940.

STEPHEN RUSHMORE, M.D., *Secretary,*
Board of Registration in Medicine.

State House,
Boston.

NOTICES

WILLIAM HARVEY SOCIETY

There will be a lecture on "Relation of the Internal Secretions to Cancer" by Dr. Joseph C. Aub, sponsored by the William Harvey Society of the Tufts College Medical School, on Friday, January 17, at 8 p.m., in the auditorium

of the Beth Israel Hospital Dr S J Thannhauser will be chairman of the meeting

All interested members of the medical profession are cordially invited

BOSTON SOCIETY OF BIOLOGISTS

There will be a meeting of the Boston Society of Biologists in the Ether Dome of the Massachusetts General Hospital on Wednesday, January 22, at 8 p.m. Dinner will be served in the dining room of the hospital at 7 p.m.

PROGRAM

Vitamin A Absorption Curves Drs John McCreary and Charles May

Vitamin A and Night Blindness A laboratory and field study Dr George Wald

Disproportionate Growth of Skeleton and Central Nervous System in Young Animals in Vitamin A Deficiency Drs S B Wolbach and O A Bessey

BOSTON LYING IN HOSPITAL

There will be a meeting of the Journal Club of the Boston Lying in Hospital on Wednesday, January 15, at 8 15 p.m. Dr. Richard D. Bryant, of the Department of Obstetrics, Cincinnati General Hospital, will speak on "Treatment of Eclampsia by Veratrum Viride"

BOSTON DOCTORS' SYMPHONY ORCHESTRA



The Boston Doctors' Symphony Orchestra will rehearse under Alexander Thuede, formerly concert master of the Cleveland Symphony Orchestra, every Thursday at 8 30 p.m. Those interested in becoming members should communicate with Dr Julius Loman, Pelham Hall Hotel, Brookline (BEA 2430)

JEWISH MEMORIAL HOSPITAL

A meeting of the staff of the Jewish Memorial Hospital will take place on Thursday, January 16, in the hospital auditorium, 45 Townsend Street, Roxbury, at 8 30 p.m. Dr Samuel A Levine will speak on "Some Important Errors in the Diagnosis of Heart Disease"

All interested physicians are cordially invited to attend

HARVARD MEDICAL SOCIETY

There will be a meeting of the Harvard Medical Society on Tuesday, January 14, in the amphitheater of the Peter Bent Brigham Hospital at 8 15 p.m. Dr A Rosenbluth will speak on "A Physiological Analysis of Abnormal Neuromuscular Function"

CUTLER LECTURE

Dr Henrik Dam, associate professor at the Biological Institute, University of Copenhagen, will give the Cutler Lecture on Preventive Medicine at the Harvard Medical School on Thursday, January 30. His subject will be Vitamin K. Its general significance in biochemistry, and its role in human pathology and its application in therapeutics, and the lecture will begin at five o'clock in the amphitheater of Building E. These lectures have been

given annually since 1912. The medical profession, medical and public health students and others interested are invited to attend

NEW ENGLAND WOMEN'S MEDICAL SOCIETY

The annual meeting of the New England Women's Medical Society will be held at the Myles Standish Hotel on Thursday, January 16. A business meeting will be held at 6 30 p.m. followed by dinner at 7 15 p.m. Dr Elbott P Joslin will speak on "My Present Interest in Diabetes"

NEW ENGLAND PATHOLOGICAL SOCIETY

The next meeting of the New England Pathological Society will be held at the Beth Israel Hospital on Thursday, January 16, at 8 p.m.

PROGRAM

March Hemoglobinuria Dr D R Gilligan

Intestinal Obstruction Dr Jacob Fine

Incidence and Distribution of Coronary Artery Occlusions Dr M J Schlesinger

Business meeting

NEW ENGLAND HEART ASSOCIATION

The next meeting of the New England Heart Association will be held at the Peter Bent Brigham Hospital on Monday, January 27, at 8 15 p.m.

PROGRAM

Pulmonary Congestion and Edema in Heart Disease With special reference to the interpretation of roentgenological findings Dr Soma Weiss

The Picture of Shock in Heart Disease Drs Richard V Ebert and L A Stead, Jr

The Prognosis of Right Bundle Branch Block Drs George Perera and Herman Erlanger

Observations on the Circulation in Some Forms of Congenital Heart Disease Drs E C Eppinger, Robert E. Gross and C Sidney Burwell

The Effect of Flow of Blood in Small Vessels on Hematocrit Reading Drs E A Stead, Jr, and Richard V Ebert

The Wolff-Parkinson-White Syndrome with Attacks of Ventricular Tachycardia Drs S A Levine and Paul B Beeson

Interested physicians and medical students are cordially invited to attend

VAN METER PRIZE AWARD

The American Association for the Study of Goiter again offers the Van Meter Prize Award of three hundred dollars and two honorable mentions for the best essays submitted concerning original work on problems related to the thyroid gland. The award will be made at the annual meeting of the association, which will be held at Boston, Massachusetts, on May 26, 27 and 28, provided essays of sufficient merit are presented in competition.

The competing essays may cover either clinical or research investigations should not exceed three thousand words and must be presented in English, a typewritten double spaced copy should be sent to the corresponding secretary, Dr W Blair Mosser, 133 Biddle Street, Kane, Pennsylvania, not later than April 1.

A place will be reserved on the program of the annual meeting for presentation of the prize-award essay by the author, if it is possible for him to attend. The essay will be published in the *Proceedings* of the Association. This will not prevent its further publication, however, in any journal selected by the author.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, JANUARY 12

SUNDAY, JANUARY 12

- †4 p.m. Hormones and Children. Dr. Joseph C. Aub. Free public lecture. Harvard Medical School, Building D.
- †4 p.m. What About Cancer? Dr. W. Stewart Whittemore. Public health lecture. Cambridge Hospital, Margaret Jewett Hall.

MONDAY, JANUARY 13

- 12:15-1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.

TUESDAY, JANUARY 14

- *9-10 a.m. Intestinal Intubation. Dr. Louis Zetzel. Joseph H. Pratt Diagnostic Hospital.
- 12:15-1:15 p.m. Clinicoröntgenological conference. Peter Bent Brigham Hospital amphitheater.
- 8:15 p.m. A Physiological Analysis of Abnormal Neuromuscular Function. Dr. A. Rosenbluth. Harvard Medical Society. Amphitheater, Peter Bent Brigham Hospital.

WEDNESDAY, JANUARY 15

- *9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.
- *12 m. Clinicopathological conference. Children's Hospital.
- *2-4 p.m. Dyspnea and Cough. Drs. C. S. Burwell and Robert Gross. Peter Bent Brigham Hospital.
- 8:15 p.m. Treatment of Eclampsia by Veratrum Viride. Dr. Richard D. Bryant. Journal Club, Boston Lying-in Hospital.

THURSDAY, JANUARY 16

- *8:30 a.m. Combined clinic of the medical, surgical, orthopedic and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital, at the Peter Bent Brigham Hospital.
- *9-10 a.m. Chorioepithelioma. Dr. J. T. Smith. Joseph H. Pratt Diagnostic Hospital.
- 6:30 p.m. New England Women's Medical Society. Myles Standish Hotel, Boston.
- 8 p.m. New England Pathological Society. Beth Israel Hospital, Boston.
- *8:15 p.m. Surgery of the Chest. Dr. Edward D. Churchill. United States Naval Hospital, Chelsea.
- 8:30 p.m. Some Important Errors in the Diagnosis of Heart Disease. Dr. Samuel A. Levine. Jewish Memorial Hospital.

FRIDAY, JANUARY 17

- *9-10 a.m. The Present Status of Pneumonia Therapy. Dr. Maxwell Finland. Joseph H. Pratt Diagnostic Hospital.
- *8 p.m. Relation of the Internal Secretions to Cancer. Dr. Joseph C. Aub. William Harvey Society. Auditorium, Beth Israel Hospital, Boston.

SATURDAY, JANUARY 18

- *9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

*Open to the medical profession.

†Open to the public.

JANUARY 13, 14 — Third Annual Congress on Industrial Health. Page 999, issue of December 12.

JANUARY 21 — South End Medical Club. Page 41, issue of January 2.

JANUARY 27 — New England Heart Association. Page 87.

JANUARY 30 — Cutter Lecture. Page 87.

FEBRUARY 13 — Pentucket Association of Physicians. Page 263, issue of August 15.

FEBRUARY 20-22 — American Orthopsychiatric Association, Inc. Page 999, issue of December 12.

MARCH 8 — American Board of Ophthalmology. Page 201, issue of August 1.

MARCH 12-14 — New England Hospital Assembly. Hotel Statler, Boston.

APRIL 21-25 — American College of Physicians. Page 1065, issue of June 20.

MAY 21, 22 — Massachusetts Medical Society, Boston.

JUNE 2-6 — American Medical Association. Cleveland, Ohio.

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

FEBRUARY 5 — Gastric and Duodenal Ulcer: Diagnosis and treatment. Dr. Arthur Allen. Lynn Hospital.

MARCH 5 — X-ray in Heart Disease. Dr. Merrill C. Sosman. Essex Sanatorium, Middleton.

APRIL 2 — Pediatric Problems in General Practice. Dr. Joseph Garland. Addison Gilbert Hospital, Gloucester.

MAY 14 — Relation of the Doctor to the Law. Mr. Leland Powers. New Ocean House, Swampscott.

FRANKLIN

JANUARY 14.

MARCH 11.

MAY 13.

Meetings will be held at 11 a.m. at the Franklin County Hospital, Greenfield.

NORFOLK

JANUARY 28 — Carney Hospital.

FEBRUARY 25 — Medicolegal meeting. 8:30 p.m. Hotel Puritan, Boston.

MARCH 25 — To be announced.

MAY 8 — Censors' meeting. Hotel Puritan.

SUFFOLK

JANUARY 29 — Page 604, issue of October 10.

APRIL 30 — Page 604, issue of October 10.

WORCESTER

FEBRUARY 12 — Worcester State Hospital, Worcester.

MARCH 12 — Memorial Hospital, Worcester.

APRIL 9 — Hahnemann Hospital, Worcester.

Supper at 6:30 p.m. followed by a business meeting and scientific program.

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

The Life of Sir William Osler. By Harvey Cushing, M.D. 8°, cloth, 1417 pp., with 10 illustrations. New York: Oxford University Press, 1940. \$5.00.

Surgical Anatomy of the Head and Neck. By John F. Barnhill, M.D., LL.D., formerly professor of otolaryngology, Indiana University School of Medicine, emeritus professor of surgery of the head and neck, formerly chief of the Department of Head and Neck Surgery, Indiana University Hospitals, and honorary professor of anatomy, University of Southern California School of Medicine; and William J. Mellinger, M.D., associate professor of anatomy, University of Southern California School of Medicine, chief of Department of Eye, Ear, Nose and Throat, Cottage Hospital, Santa Barbara, and otolaryngologist, Santa Barbara General and St. Francis hospitals. Introduction by Paul S. McKibben, professor of anatomy, University of Southern California School of Medicine. Second edition, rearranged and revised. 4°, cloth, 773 pp., with 431 illustrations. Baltimore: Williams & Wilkins Company, 1940. \$15.00.

Diagnosis and Treatment of Arthritis and Allied Disorders. By H. M. Margolis, M.D., M.S. (in med.), chief, Arthritis Service, St. Margaret Memorial Hospital, associate in medicine, Montefiore Hospital, and consultant in medicine, Pittsburgh Diagnostic Clinic. 8°, cloth, 551 pp., with 140 illustrations. New York: Paul B. Hoeber, Incorporated, 1940. \$7.50.

The New England Journal of Medicine

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VOLUME 224

JANUARY 16, 1941

NUMBER 3

WHITHER AMERICAN OBSTETRICS?^{*}

NICHOLSON J. EASTMAN, M.D.†

BALTIMORE

I SHOULD be most remiss if I did not acknowledge at the outset my deep appreciation of the honor accorded me by your invitation to speak here on Walter Channing Day, at this Founders' Day meeting of the Boston Lying-in Hospital, an institution that has so long exemplified the finest traditions of American obstetrics, and the annals of which are so rich in contributions of the first order. But my gratification at being here is based not only on these circumstances, but is attributable in no small measure to another consideration. I refer to the close and pleasant relation that exists between the Boston Lying-in Hospital and our own department of obstetrics at Johns Hopkins. As many of you know, twice a year one of your assistant residents braves the uncertainty of Maryland weather and the vagaries of Johns Hopkins Hospital food, to spend six weeks with us in Baltimore. In exchange, your professor of obstetrics accepts one of our assistant residents for the same period. Save for a brief interval, this semiannual interchange has gone on since May, 1927, a period of almost fourteen years. Since these men visit the other clinic only after prolonged experience in their own institutions, they are in a position to evaluate the new methods seen and the new points of view encountered with a mature critique, and can take for their own what they like and leave what seems less desirable. It is thus a broadening experience in their postgraduate education; and I believe I voice the opinion of Dr. Irving as well as my own in saying that I hope the bond between the two institutions which this interchange has established may long continue.

In the course of any undertaking it becomes desirable from time to time to take stock of present achievements and ask, Whither are we going? The present moment would seem ripe for such

an inquiry, since recent events in Europe leave no doubt that in obstetrics, as in other branches of knowledge, little can be expected from that source for many years, possibly for many decades. During the last three centuries the torch of leadership in obstetrics has been carried, in turn, by three countries in the seventeenth century by France, where the labors of Paré, Mauriceau, de la Motte, Dionis and others first made it possible for men to gain access to the delivery chamber (without being burned at the stake), in the eighteenth century by England, where Smellie, William Hunter, Charles White, Denman and others succeeded in raising the status of obstetrics from the buffoonery of male midwifery to the dignity of a profession, and, finally, in the nineteenth century by Germany, where the studies of von Brier, Naegele, Semmelweis, Michaelis, Credé and a host of others infused scholarship into obstetrics and made it one of the great branches of medical knowledge. During the first four decades of the present century, the contributions of American obstetricians have been such that even in the natural course of events, leadership would probably have fallen to us. But with the present chaos abroad, there can be no doubt where the onus lies. Yes, if advances are to be made in obstetrics during the twentieth century, it looks very much as if we must make them. This is a heavy responsibility. What are we to do about it?

By way of reassurance, let us recall that the record of American obstetrics is already one of which we may well be proud. Your own Autocrat of the Breakfast Table, almost a hundred years ago, was the first to demonstrate conclusively the contagiousness of puerperal fever, and shares with Semmelweis the glory of discovering the cause of that great scourge. At about the same period, but far removed from the Boston of Holmes, a group of pioneers on the very outposts of American civilization were making another important contribution to obstetrics, but one that

^{*}An address delivered at the Walter Channing Day dinner at the Boston Lying-in Hospital, October 24, 1940.
From the Department of Obstetrics, Johns Hopkins University and Hospital.

†Professor of Obstetrics, Johns Hopkins University School of Medicine and Obstetrics-in-Chief, Johns Hopkins Hospital.

is less well known. This almost forgotten contribution of frontier America to obstetrics would seem to merit a few minutes' consideration.

As you all realize, throughout the greater part of the nineteenth century cesarean section was the most fatal of surgical procedures, the mortality in Great Britain and France, for instance, approximating 85 per cent prior to 1865; in Paris, during the ninety years ending in 1876, not a single successful cesarean section had been performed. In the face of such results, it is not surprising that many obstetricians of the nineteenth century doubted the wisdom of ever resorting to this procedure, and predicted that the operation would shortly lapse into desuetude. The turning point in the evolution of cesarean section was the appearance in 1882 of a monograph by Max Sänger, then a twenty-eight-year-old assistant of Credé in the university clinic at Leipzig, in which he recommended the routine employment of carefully placed uterine sutures. Prior to this time, both in England and in Europe, uterine sutures were regarded not only as unnecessary but as actually harmful, since they seemed to predispose to suppuration. Sänger's recommendation, therefore, was completely at variance with the views then prevalent and, curiously enough, was based on his experience with but one case. Nevertheless, his contentions were supported by such carefully documented evidence, and his facts marshaled in such a logical and convincing manner, that the justice of his claim was apparent. Confirmation of his convictions followed quickly. Within a few years uterine suture was recognized as an indispensable part of cesarean section, and forthwith the modern operation came into being. Recalling, now, that Sänger's recommendation was founded on a single experience only, the question naturally arises, Whence came his idea? What were the sources of that carefully documented evidence in favor of the uterine suture? Who were his forerunners?

The answer to this question Sänger, himself, states frankly and without reserve. His predecessors were certainly not his colleagues in the sophisticated centers of Europe who, as we have said, opposed the suture, but were—oddly enough—certain pioneer surgeons working in the outposts of the American frontier. From Toledo to New Orleans these men had reported seventeen cases of cesarean section in which silver-wire sutures had been placed in the uterus, with the lowest mortality ever recorded. These cases are all carefully tabulated in Sänger's monograph, and full credit is given the Americans for having been the first to demonstrate the value of uterine suture in cesarean section. In all fairness to Sänger, it

must be stated that it was his study that dealt the final blow to the old methods. He not only advocated the routine use of aseptic sutures, but showed in the minutest detail how to insert them; and by combining the scientific principles of wound coaptation with full Listerian technic, he created at one full stroke the modern operation. But to have furnished the supporting data for Sänger's hypothesis and to have devised and demonstrated the earliest successful type of uterine suture were certainly no mean achievements, and they may be recalled with pride as contributions of frontier America to cesarean section.

Some years ago, we had as a visitor to our clinic Dr. Ernst Philipp, now professor of obstetrics and gynecology at the University of Kiel. After he had spent a year in this country and had visited our leading clinics, I asked him how obstetrics here differed most markedly from obstetrics in Germany. His answer was immediate: obstetrics in the United States, he said, is far ahead of that in Germany in two respects: prenatal care, and anesthesia and analgesia. Myself a graduate of Yale and a member of the faculty of Johns Hopkins, I state with mixed feelings the fact that both these movements received their greatest impetus at Harvard. Since many of you are far better acquainted than I am with the early work in these two fields, I shall simply mention most briefly the fact that prenatal care, as we understand it, may be said to date from 1901, when the Instructive Nursing Association of this city began to pay prenatal visits to some of the women in the Outpatient Department of the Boston Lying-in Hospital. So far as anesthesia and analgesia are concerned, the very word "anesthesia," of course, was proposed by Holmes. Here in Boston, also, Dr. N. C. Keep on April 7, 1847, was the first American to administer ether to a patient in labor. A month later, Dr. Walter Channing, to whose memory we pay homage now, administered ether before applying forceps; his monograph on the subject, the first comprehensive survey of the relief of pain in labor, appeared the following year. Entitled *A Treatise upon Etherization in Childbirth*, it analyzes the results in five hundred and eighty-one cases, eighty-seven his own and the remainder derived from other sources in the country. And today, it is gratifying to know that this old tradition is being continued here and that, amid the huge modern literature on the subject, the one article that is a standard for all others comes from this clinic, under the authorship of Irving, Berman and Nelson.

But enough of the past. What of the present and future? One of the most conspicuous of re-

cent trends has been the tendency to combine obstetrics and gynecology as a unified specialty. A favorite topic for presidential addresses,—and indeed for occasions of just this kind,—numerous dissertations have been delivered on this subject; without exception, so far as I know, they all urge the combination with a fervor reminiscent of the Crusades. In Europe, as well as throughout the British Empire, obstetrics and gynecology have long been regarded as a single specialty, and there this union appears to function satisfactorily, both in practice and in university work. Obstetrics and gynecology are concerned with a single group of organs, the female reproductive tract. It is becoming increasingly evident, moreover, that many of the changes which the maternal organism undergoes in pregnancy are simply exaggerations of certain alterations that the nonpregnant woman exhibits every month; that the same hormones which control pregnancy and labor govern also many phenomena in the nonpregnant woman, including menstruation; and that abnormalities in the hormone balance are probably responsible for some of the major disturbances of pregnancy as well as for those of menstruation. Indeed, recent research in endocrinology has so welded obstetrics and gynecology that any basic study in either subject is becoming almost impossible without an intimate knowledge of the other. And so far as clinical work is concerned, it is widely recognized that no one can practice either specialty with full competence unless he has some knowledge of the other.

In consideration of all these valid reasons for a combined department, I venture to cite another point of view—my own point of view—with some diffidence. I can do so most succinctly, if it is not beneath the decorum of this occasion, by recalling the refrain of an old musical comedy song, which runs, "You Can't Play Every Instrument in the Band." During the six years I spent in a combined department, I remember going, on occasion, from the operating room, where prolapse of the uterus may have been the problem at hand, to the nursery for the newborn where perhaps a case of atelectasis was under survey; from there to the carcinoma clinic, where the cytologic structure of a cervical growth may have been under discussion, followed by an argument with the physicist as to the best type of roentgen-ray therapy for a pelvic carcinoma; from there to the prenatal clinic or ward, where possibly a case of pre-eclampsia or some medical complication of pregnancy was proving worrisome; and thence to the delivery room, where a woman with a borderline pelvis was being given a test of labor. Now,

there may well be men who are capable of knowing intimately these several fields, who can keep up with the literature in each and whose clinical and operative skill in each is exemplary. There may be; but I myself cannot claim such versatility, and I am certain that the average man cannot attain excellence in so many disciplines; and, after all, we must tolerate no compromise with excellence. It seems to me beyond question that every man who proposes to engage in either obstetrics or gynecology must have sound fundamental training in the other field, including major operative work, but as he leaves his house-staff period, it is my belief that his interests and capabilities, as well as fortuitous circumstances, will naturally—and for the good of all concerned—narrow the major part of his work to one field or the other. Indeed, is not the basis of all modern specialization the fact that to attain excellence in a given field it is necessary to limit the scope of that field? Witness the fields of brain surgery, thoracic surgery and rectal surgery. If we are to attain excellence in obstetrics, if we are to make advances in it, it seems to me that we shall be most likely to do so if our efforts are concentrated on the problems of that specialty rather than disseminated over the manifold aspects of obstetrics and gynecology.

Students of jurisprudence claim that the best laws are those which repeal earlier laws—which correct previous errors of legislation. Obstetrics, too, has its laws, or at least traditions so old and deeply entrenched that they assume all the inviolable character of laws. Most of these are good and must be clung to. But our modern canon of obstetrics, let us recall, is built on foundations laid in times very different from ours—when the facilities of the modern hospital were undreamed of, when abdominal surgery was a desperate undertaking and when blood transfusion was unknown. Half a century ago, furthermore, the tools and methods of investigation were crude in contrast to ours, and some of the theories that had their genesis in that epoch are possibly open to question. For these and other reasons, certain of these old teachings have tended, I fear, to deter rather than promote obstetric progress. May I cite three examples of what I mean?

Until recent years, one of the most deep-rooted obstetric teachings had to do with the belief that the bag of waters played the principal role in cervical dilatation and was therefore indispensable to normal labor. It was for this reason that artificial puncture of the membranes, a favorite method of inducing labor in the eighteenth century, was abandoned early in the nineteenth century in favor of bags and bougies. Emphasized in

textbook after textbook, this conception that the hydrostatic action of the amniotic sac is essential for normal labor has long been regarded as an almost axiomatic truth. It has been part and parcel of all our obstetric teaching, and until very recently we have found it difficult, as did obstetricians a hundred years ago, to view without prejudice the deliberate puncture of the membranes for the induction of labor or any other purpose. It was not until some ten years ago that a group of American obstetricians had the openness of mind and the fortitude to challenge this old doctrine by rupturing the membranes to induce labor. We now know, on the basis of thousands of cases, that this is usually the best method of initiating labor and that the bag of waters has little or no function in cervical dilatation and effacement. In other words, this old and fallacious doctrine served, for a century and a quarter, to discredit and hold in desuetude one of the most valuable obstetric procedures.

My second example is of quite a different nature, and concerns itself with the age-old belief that interference with the childbearing career of a woman is at variance with the highest medical ethics—a blot on one's obstetric conscience. In an analysis of over forty-five thousand consecutive deliveries, we have found that women who have borne eight or more children experience three times the maternal mortality in subsequent pregnancies, and twice the stillbirth mortality met by women in the lower parity brackets. Study of the causes of death in these grand multiparas shows that they are usually a well-defined group of conditions, which, in turn, are basically brought about by reproductive senility. In view of the great hazards faced by these women in childbearing and the transcendent value they have to their large families, we are recommending sterilization in all women who have had eight or more children, solely on the grounds of great multiparity. This is usually done under local anesthesia, early in the puerperium. Although this practice may offend the sensibilities of some obstetricians, we regard it as a prophylactic step in reducing maternal mortality. Indeed, if every woman at the time of conception could be a healthy woman, our maternal mortality, I am certain, would be reduced forthwith by one quarter.

My third and last example has to do with the use of pituitary extract in labor. Because untrained or injudicious practitioners have used the drug in excessive doses, or in obstructed labors, many tragic accidents have resulted; and consequently it is widely held that this substance should never be used before the baby is born. Despite

the fact that uterine inertia is the commonest cause of dystocia and not infrequently ends in intra-partum infection, Dührssen's incisions and difficult mid-forceps operations, I long held to the orthodox viewpoint, objecting to the employment of pituitary extract during the first and second stages, particularly by the intramuscular route. A few years ago, one of our assistant residents returned from his service at the Boston Lying-in Hospital very enthusiastic about the therapy used here in inertia, namely, minute doses of intramuscular pituitary extract in association with analgesia. I was frankly skeptical, but permitted a trial, with the reservations that the initial dose should never exceed 1 minim, that the maximal single dose should be 2 minims and that the utmost care should be used in avoiding its administration in obstructed labor. We have now employed this program in uterine inertia for two years and have reduced our incidence of difficult mid-forceps operations from ten or twelve a year to one or two; the need for Dührssen's incisions has diminished proportionately; and there have been no untoward results. Here, then, is another break with an old tenet, which, in cautious hands, seems advantageous.

In citing these three examples of outmoded theory and practice, I have no desire to discredit the great mass of obstetric knowledge handed down to us, but wish merely to recall that obstetrics is still trammled by some ideas that are not valid, the legacy of a day long past. If obstetrics is to keep pace with modern knowledge, we must be constantly scrutinizing, with an open mind and wary alacrity, the old teachings as well as the new.

Having mentioned, in rapid succession, artificial rupture of the membranes, the sterilization of grand multiparas, the use of pituitary extract in labor, and analgesia, my conscience gives me pause, for I can see at once a host of obstetric worthies rising in opposition, with the accusation that a prophet of unbridled radicalism is before you. I can hear the old objection that labor is a normal process in which we should brook no interference, unless it is urgently needed. I can hear, in particular, the objection that such artificial procedures, if employed by practitioners of obstetrics throughout the country, are bound to result in countless disasters. In regard to the first objection, namely, that we should not interfere with such a natural process as labor, this accusation has been brought against almost every advance that has ever been made in obstetrics. I have no doubt that emphasis on this principle has done much good, for it has militated against injudicious interference, but if we are to answer truth-

fully the question, "Whither American obstetrics?" we can only acknowledge that obstetrics, in the hands of specialists at least, is veering in the direction of substituting, at various stages of labor, artifice for the oft-times slow, ineffectual and cruel vagaries of Nature. In the last quarter of a century the incidence of cesarean section in the lying-in hospitals of this country has increased fivefold, the frequency of elective low-forceps operations has shown an even steeper rise, whereas analgesia to the point of amnesia is almost routine in most large centers. It is true that some of these practices are at times used ill-advisedly, but if anyone's nostalgia for the "old days" persuades him that we shall ever go back to the "natural obstetrics" of a few decades ago, he is grievously in error. And he is in error because our obstetrics today is better obstetrics than that practiced by our fathers, as shown by the only valid criterion, namely, end results in thousands of cases. Fewer mothers die, fewer babies die and fewer women are left scarred, either physically or mentally, as the result of the process.

The type of obstetrics to which I refer, of course, is that practiced by the modern obstetric specialist—the man who has had long years of training in operative obstetrics and has an even keener eye for contraindications than for indications. He can almost sense when artificial rupture of the membranes would be hazardous or when elective forceps might lead to difficulty. What will be the outcome if the rank and file of general practitioners, who read about these procedures and observe them in clinics, attempt to practice them? I can give you some idea of what I think would happen by saying that among the cases referred to the Johns Hopkins Hospital after unsuccessful attempts with forceps by outside physicians, the majority show on admission a cervix that is less than eight centimeters dilated. Since the majority of babies in the United States are delivered by general practitioners, this problem is difficult to meet, but of one thing I am sure: our standards of obstetrics in maternity hospitals cannot be dictated by the capabilities of the general practitioners. I am equally certain that the average general practitioner, the man who is devoting but a fraction of his time to obstetrics, will do far more harm than good by indulging in the artifices which the specialist is using. Just because a man can do a spinal puncture is no indication that he can do a laminectomy; and the general practitioner must

understand his limitations and the fact that only in expert hands and in a well-equipped maternity ward can Art improve upon Nature, and then only when seasoned judgment is used. I realize full well the implication of what I am saying, namely, that two types of obstetric practice are likely to be evolved, one followed by the specialist and the other by the general practitioner. Illogical as it may appear, I can see no other solution; and perhaps, in the long run, such an arrangement might prove advantageous. Under such circumstances, the general practitioner might regard obstetric surgery in the same light that he views other types of major surgery, and realize more fully than he does now the need for consultation in the major complications of pregnancy and labor.

Having stressed the fact that many of our obstetric teachings are derived from a time far removed from ours, I should like, in concluding, to point out that many of our ethical concepts originate from an even more distant period, when the social, economic and religious circumstances of life were altogether different from what they are today. It may well be that these old ethical teachings in regard to contraception, sterilization and abortion constitute our salvation, but in a changing social order it behooves us to examine each with unbiased perspective, to be sure that it makes for the greatest good of the greatest number. As an example of what I refer to, the psychiatrists are continually coming to us with their scourging genealogical histories,—their records of unfit giving birth to still more unfit,—and they beg for sterilization, even for abortion. I should not venture to answer this difficult and far-reaching question, but bespeak merely an attitude of mind unshackled by rules that were helpful a century ago.

There are other trends to which I might refer. But I have said enough, I believe, to make plain my viewpoint. Progress in obstetrics must depend on approaching its problems with an open mind, a mind willing to evaluate today's questions in terms of today's knowledge. If we do but this, I venture to hope that some future historian of obstetrics, as yet unborn, will write:

In the twentieth century the torch of leadership in obstetrics was carried by the obstetricians of the United States of America; they found obstetrics still fettered by traditions that were as outworn medically as they were sociologically; they left it a liberal, progressive science, sensitive at once to the best interests of the patient and the needs of a changing civilization.

THE EDUCATION OF THE INTERN*

NATHAN SMITH, M.D.†

Introductory Remarks by

NATHAN B. VAN ETTEN, M.D.‡

NEW YORK CITY

I AM going to introduce briefly a gentleman who will tell you what we are doing at the Morrisania City Hospital for the training and education of interns. In presenting this study of intern education, we are making a record of obedience to the requirements of the Council on Medical Education and Hospitals and of the American College of Surgeons.

The Morrisania City Hospital is one of the twenty-six municipal hospitals in New York City. Its normal bed capacity of 539 is frequently exceeded, and with an average patient's stay of nine days, a large clinical procession is reviewed by the interns and residents. The student body is composed of fourteen residents and thirty-four interns, a ratio of intern to patient of 1:15.

To qualify for endorsement, an effort has been made to carry out in detail not only the letter but the spirit of the Council's requirements, and to go farther into the field of educating interns in the practicalities of medical care, to prepare them for similar problems that may later arise in their private work.

Medical education is far from a finished product, partly because it attempts to do too much through the long years devoted to it. In spite of the eight college years required for the degree of doctor of medicine, so much time that should be spent in teaching practical clinical treatment is devoted to smatterings of specialties that the students are in a confused state of mind when they receive their degrees. At the Morrisania City Hospital, we are impressed with the fact that the new interns have very little practical understanding of the meaning of a medical career. The Council undoubtedly desires to raise the quality of medical education. It will be making a real accomplishment if it can raise the level of the medical intelligence of the average doctor, so as to fit him for the better care of the average patient.

The general practitioner must not be frightened out of confidence in his ability to take care of the usual surgical, obstetric and medical problems. He is one of the most valuable citizens in this republic, and must be given the right kind of educa-

tion. The force of opinion may demand a better practical education for the general practitioner, so that he may be able to render better medical service to people on low incomes.

The Council would probably do well to resurvey all medical schools to discover any failures to solve this problem. It has the equipment, the personnel and the funds to do this work, and I believe that it should be encouraged to undertake it.

Ten years ago, a young man, Dr. Nathan Smith, entered the administrative service of our hospital, and so quickly showed an unusual interest in intern training that the executive direction of it was assigned to him. Although every encouragement was given to inquiring minds, the greatest emphasis was placed on the practical application of medical knowledge. In 1936, Dr. Smith developed a scheme for intensive training in the Outpatient Department, where the interns could closely observe ambulatory patients such as they might meet in their own offices. This has proved to be a successful adventure into reality.

Dr. Smith also arranges for lectures on practical subjects on forty Wednesday afternoons during each year. The subjects are chosen by the interns, and the lectures are given by distinguished New York physicians.

He will now give a general outline of his plan for the education of interns.

* * *

Recent years have been marked by outstanding advances in the field of intern education. The comprehensive study of hospital internships initiated by the New York Committee on the Study of Hospital Internships and Residencies under the guidance of Dr. Jean Alonzo Curran, executive secretary of the committee and now dean of Long Island Medical College, has served as a stimulus to many hospitals for a better organization and conduct of intern education.

The internship has become a very essential part of the clinical preparation of the student in medicine. It is now widely realized that it provides a most desirable contact and experience with the problems and responsibilities of clinical work and helps to bridge, in a satisfactory manner, the transition from academic life to that of the practitioner.

*Presented at the annual meeting of the New Hampshire Medical Society, Manchester, May 15, 1940.

†Deputy medical superintendent, Morrisania City Hospital.

‡President, American Medical Association.

Because nearly all graduates in medicine are taking internships, and are often devoting not only one but several years of their lives to this form of practical training, it is most essential that the internship offered and accepted be properly organized to provide the incumbents with the type of training and experience that will best supplement their previous instruction.

The acceptance of interns implies a definite obligation on the part of both the intern and the hospital and its staff. The former is under definite obligation to give faithful, conscientious service, to fulfill scrupulously his contract and to follow the hospital rules and regulations.¹ The hospital that has interns must also accept the responsibility that this implies. The intern is there to complete with practical work and suggestions the largely theoretical part of his earlier education. His training should lie in the hands of the hospital, just as the training in the medical school is now carried on by the faculties of our medical colleges.

When it is considered how much the graduates of our medical schools still have to learn through practical experience, and how many of them go out from our internships to become the sole medical advisers of patients, the responsibility of the hospitals for their training is an important one.

The intern's schedule should be planned in such a manner that he will derive all the benefits of a varied and instructive program. Nothing should be taken for granted. Any hospital that has an adequate supply of clinical material may very readily adopt the suggestions and material used in this presentation.

PLANNING THE INTERN SCHEDULE?

The student just out of medical school comes to a hospital for the chief purpose of acquiring knowledge. The establishment of a schedule before the intern group comes in and the carrying out of that schedule are dependent on careful planning in preparing for future work in general practice. These functions in some institutions are highly administrative procedures. However, the administrator should take into consideration the advice and counsel of his medical board.

The value of the internship necessarily varies with the quality of the hospital in which it is spent. Generally speaking, students with better training apply to and are absorbed by the better hospitals. Thus it happens that a poorly trained graduate may be further damaged by an internship served in a poorly organized and poorly conducted hospital.

The hospital that accepts interns should act as

in educational department that undertakes to give them training calculated to meet the needs of their future potential patients, as well as for the immediate requirements of the patients in the hospital. The institution must realize that the medical school cannot be expected to produce fully trained doctors; it can at most hope to equip students with a limited amount of fundamental knowledge, to train them in the method and spirit of scientific medicine, and to launch them with a momentum that will make them active learners, observers, readers, thinkers and experimenters for years to come. In short, the hospital should be the finishing school of the young doctor who has just graduated from medical school.

It is obvious that for the study of disease and the training of interns there must be an adequate supply of clinical material. Diagnosis, treatment and teaching should be the function of an able staff. A systematized schedule containing medicine, surgery, pediatrics, obstetrics and related specialties is essential, and the schedule must guarantee the training of the practical doctor without gaps. A general hospital with all the branches of medicine and surgery should assure the intern of the opportunity to learn all types of disease.

PERIOD AND TYPE OF INTERNSHIP

Different opinions are held as to the length and type of training for an intern before commencing practice. An internship for the general practice of medicine should last for at least two years and the service should be a rotating mixed one. Regardless of whether the young intern is aiming for general practice or a special residency, the general duties and training should be identical. In the rotating mixed internship special arrangements should be made for the person who intends to specialize in surgery by having him devote more time to it, but at no time should he be deprived of the essentials in medicine.

Table 1 gives a schedule that is the result of a careful study and many revisions; it demonstrates the two year rotating mixed internship very well. This may be of interest for the purpose of comparison with other schedules.

The total number of months spent on each service, on both the medical and surgical appointments, is as follows:

SURGICAL APPOINTMENT

Surgery, 10½ months

Three months as "junior" on general surgery with pathology, covering his own clinical and surgical pathology and including instruction in anesthesia.

Three months as assistant senior on skeletal surgery, including traumatic and orthopedic surgery.

One and a half months as "senior" on general surgery, including gynecology.

Three months as "house" on general surgery.

Medicine, 4½ months.

Three months as "junior" with pathology, covering his own clinical pathology.

One and a half months as "senior."

Obstetrics, 6 weeks.

Pediatrics, 6 weeks (covering his own clinical pathology).

Eye, ear, nose and throat and Chest Service, 6 weeks.

Outpatient Department, 6 weeks (special clinic schedule).

One and a half months as "senior" on general surgery, including gynecology.

Obstetrics, 6 weeks.

Pediatrics, 6 weeks (covering his own pathology).

Eye, ear, nose and throat and Chest Service, 6 weeks.

Outpatient Department, 6 weeks (special clinic schedule).

Ambulance and emergency-room service, 3 months.

This, however, means only forty-five days of actual riding, since the interns work on alternate days only. It also includes active participation in the treatment of acute emergency patients who either walk in or are transported to the emergency room.

TABLE 1. *A Model Intern Schedule for a Two-Year Rotating-Mixed Service.**

PERIOD	ASSIGNMENT	INTERN A	INTERN B	INTERN C	INTERN D
First three months	Junior	Surg. I and path. intern	Surg. II and path. intern	Med. I and path. intern	Med. II and path. intern
Second three months	Junior	Med. I and path. intern	Med. II and path. intern	Surg. I and path. intern	Surg. II and path. intern
Third three months	Pediatrics and Obstetrics	Ped., 6 wk. Obs., 6 wk.	Ped., 6 wk. Obs., 6 wk.	Obs., 6 wk. Ped., 6 wk.	Obs., 6 wk. Ped., 6 wk.
Fourth three months	Ambulance	Amb.	Amb.	Amb.	Amb.
Fifth three months	E. E. N. T. and Chest Service, and Specialty Clinic	Spec. Cl., 6 wk. E. E. N. T. and C. S., 6 wk.	Spec. Cl., 6 wk. E. E. N. T. and C. S., 6 wk.	E. E. N. T. and C. S., 6 wk. Spec. Cl., 6 wk.	E. E. N. T. and C. S., 6 wk. Spec. Cl., 6 wk.
Sixth three months	Assistant senior	Skeletal surgery	Skeletal surgery	Skeletal surgery	Skeletal surgery
Seventh three months	Senior	Surg. I and Gynecol., 6 wk. Med. I, 6 wk.	Surg. II and Gynecol., 6 wk. Med. II., 6 wk.	Med. I, 6 wk. Surg. I and Gynecol., 6 wk.	Med. II., 6 wk. Surg. II and Gynecol., 6 wk.
Eighth three months	House	Surg. I	Surg. II	Med. I	Med. II
		INTERN E	INTERN F	INTERN G	INTERN H
First three months	Junior	Med. I and path. intern	Med. II and path. intern	Surg. I and path. intern	Surg. II and path. intern
Second three months	Junior	Surg. I and path. intern	Surg. II and path. intern	Med. I and path. intern	Med. II and path. intern
Third three months	Ambulance	Amb.	Amb.	Amb.	Amb.
Fourth three months	Pediatrics and Specialty Clinic	Spec. Cl., 6 wk. Ped., 6 wk.	Spec. Cl., 6 wk. Ped., 6 wk.	Ped., 6 wk. Spec. Cl., 6 wk.	Ped., 6 wk. Spec. Cl., 6 wk.
Fifth three months	Assistant senior	Skeletal surgery	Skeletal surgery	Skeletal surgery	Skeletal surgery
Sixth three months	Senior	Surg. I and Gynecol., 6 wk. Med. I, 6 wk.	Surg. II and Gynecol., 6 wk. Med. II., 6 wk.	Med. I, 6 wk. Surg. I and Gynecol., 6 wk.	Med. II., 6 wk. Surg. II and Gynecol., 6 wk.
Seventh three months	House	Surg. I	Surg. II	Med. I	Med. II
Eighth three months	Obstetrics, and E. E. N. T. and Chest Service	E. E. N. T. and C. S., 6 wk. Obs., 6 wk.	E. E. N. T. and C. S., 6 wk. Obs., 6 wk.	Obs., 6 wk. E. E. N. T. and C. S., 6 wk.	Obs., 6 wk. E. E. N. T. and C. S., 6 wk.

*This schedule has been in operation in a hospital of approximately 540 beds but lends itself very readily to a smaller hospital. By dividing the schedule in half it may be used for a hospital of 250 or 300 beds.

Ambulance and emergency-room service, 3 months.

This, however, means only forty-five days of actual riding, since the interns work on alternate days only. It also includes active participation in the treatment of acute emergency patients who either walk in or are transported to the emergency room.

MEDICAL APPOINTMENT

Medicine, 7½ months.

Three months as "junior" with pathology, covering his own clinical pathology.

One and a half months as "senior."

Three months as house.

Surgery, 7½ months.

Three months as "junior" with pathology, covering his own clinical and surgical pathology.

Three months as "assistant senior" on skeletal surgery, including traumatic and orthopedic surgery.

As will be seen in the above schedule, the only differences are that the surgical intern receives three more months of surgery than the medical, and the medical intern three more months of medicine than the surgical. Although this program has been devised for and has been in operation in a public hospital, it is sufficiently flexible to be used in any general hospital.²

It has always seemed to me that the training in the office specialties has been grossly neglected. Very few interns have any experience in the practical problems of home and office practice. It is a foregone conclusion that a small number are likely to become specialists, but all are confronted at first with general office practice. Therefore, the six-weeks outpatient specialty service is included at

the beginning of the second year of the internship.

The intern is assigned to these clinics as part of his regular rotating service. A systematic program of instruction in the form of postgraduate training is conducted by the senior members of the visiting staff, and includes the following specialties: venereal disease, office gynecology, urologic diagnosis, dermatology, allergy, proctology, physiotherapy, electrocardiography and injection of varicose veins, the greater number of which he will encounter in his office practice.³

It is not unusual to find that an intern, after completing his two-year internship, is not able to perform a diathermy treatment, treat a case of hay fever, treat an uncomplicated case of gonorrhea or read an electrocardiographic tracing. The average intern may attempt these without realizing their limitations; others have to resort to the

and the proper attitude toward the nursing staff, the attending staff and other members of the hospital organization.

After the preliminary personal interview the interns are introduced to the members of the medical board, the members of their medical staffs and the heads of divisions of the hospital, and are taken on a tour of inspection through the institution.

Two days previous to commencement of their internship the new members of the house staff are given a complete physical examination, including x-ray examination of the chest, a complete blood count, urinalysis and other laboratory data that may be indicated. These examinations are repeated annually, and an effort is made to correct any abnormalities.

In the Morrisania City Hospital, through the co-operation of the administrative, attending, res-

TABLE 2. *Schedule of Specialty Clinics and Periods of Instruction.*

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
9 00-10 00 X-Ray	9 00-9 45 X-Ray and Fluoroscopy	9 00-9 45 X-Ray	9 00-10 30 Physical therapy	9 00-11 00 Lecture	9 00-10 30 X-Ray and Fluoroscopy
10 00-11 00 Baby Health	9 45-10 30 Genito-urinary	9 45-10 15 Basal metabolism	10 30-12 00 Gonorrhea	11 00-12 00 Tumor	10 30-12 00 Endocrine
11 00-12 00 Tumor	10 30-12 00 Tuberculosis rounds	10 15-11 15 Prenatal and Postnatal			
		11 15-12 00 Dental			
1 00-1 30 Electrocardiography	1 15-2 30 Skin	1 00-2 00 Pharmaceutical conference	1 00-2 00 Electrocardiography	1 00-2 00 Electrocardiography	
1 30-2 30 Gynecology	2 30-5 00 Rectal	2 00-3 00 General conference	2 00-3 00 Peripheral Vascular	2 00-5 00 Allergy	
2 30-5 00 Peripheral Vascular		3 00-4 00 Skin	3 00-5 00 Diabetes		
		4 00-5 00 Instruction in x-ray technique			

various circulars issued by drug houses relating to treatment of these specialties, and still others obtain information from the salesmen who sell the various types of apparatus.

Table 2 gives the schedule of specialty clinics used in the Morrisania City Hospital.

INTRODUCTORY PROGRAM FOR THE NEW INTERNS

In dealing with problems of hospital administration the administrator sometimes overlooks the problems of the "new intern," who has difficulty adjusting himself to a new environment, a new hospital and a new routine.

It is therefore important that the intern, before commencing his internship, be given a personal interview by the superintendent and his assistants, at which time credentials are examined and the hospital executives discuss, emphasize and clarify the following points: the rules and regulations of the hospital, an outline of routine duties, the care of the patient, the treatment of the patient's family,

ident, nursing, social-service and dietary divisions, it has been possible to formulate a program that is applied to the members of the intern group on five consecutive days prior to commencement of their duties. The program consists of seven lectures and demonstrations at which time the intern is carefully instructed in the meaning and work of these various divisions, as outlined below:

INTERN PROGRAM

Lecture 1.

Discussion of rules and regulations of Morrisania City Hospital: medical superintendent.

Discussion of intern schedule and hospital forms: deputy medical superintendent.

Discussion of social-service problems and activities: director of social service.

Discussion of dietetics in health and disease: chief dietitian.

Orientation tour of hospital and short discussion on nursing problems: superintendent of nurses.

Lecture 2. Practical demonstrations*

Infusion and phlebotomy
Hyperdermoclysis
Thoracentesis
Paracentesis
Pneumothorax
Lumbar puncture
Surgical dressings

Lecture 3. Practical demonstrations

Operating room technic

Preparation

Change of uniform
Cleansing hands
Sterile gown and gloves
Approach to operating field
Changing gloves during operation
Changing position during operation

Care of patient after operation

Examination for iodine
Dressings

Rules of operating room for spectators

Caps, gowns and masks
Amphitheater

Set-up of instruments and their care

Needles
Syringes
Scissors and so forth

Demonstration of surgical hemostasis and closure (surgical knots)

Restraints

Adults

Ankle and wrist
Shoulder
Body
Bed sheet
Canvas with straps
Sideboards

Children

For examination
Jacket for active child

Lifting and turning of patients in bed

Daily care

Hair
Nose
Mouth
Ears
Back

Lecture 4. Practical demonstrations

Counterirritants

Flaxseed poultice
Mustard paste
Turpentine stupe
Mustard bath for children
Croup tent

Enemast†

Purpose
Types (cleaning, oil, carminative, stimulative and so forth)
Medications and materials

Irrigations

Purpose
Types (ear, nose, throat, eye)
Supplies used

Lecture 5. Practical demonstrations

Cold sponge bath
Cold pack
Prevention and care of bed sores

Lecture 6. Practical demonstrations

Tracheotomy (done in the morgue)
Insertion of tracheotomy tube
Nasal pack

Lecture 7. Practical demonstrations

Drinker respirator and inhalator
Resuscitation apparatus
Oxygen tent
Incubator
Operation of blood bank and blood transfusion
Instructions in standard nomenclature of disease and hospital records
Ambulance requirements and management of emergencies
First-aid treatment of fractures and dislocations
Instructions in laboratory procedures
Instruction in procedure for obtaining consent for post-mortem examination and the performance of autopsies

The demonstration of a mustard paste or an ear irrigation may appear to be beneath the dignity of an intern, but as a matter of fact when these demonstrations were given the interest of the interns was manifested and led to many constructive inquiries. Although this may appear to be and is fundamental, its purpose is to familiarize the new intern with the essentials of common procedures too frequently either overlooked or entirely forgotten. They are procedures a doctor in practice may be called upon to perform or direct.⁴

The five days in the hospital prior to the commencement of internship may be called the "critical period," because it is during this time that the intern is familiarized with the established standards of the hospital. This period of introduction to the hospital has created a unity of spirit and a better co-operation between the attending staff, interns, nurses, employees and administrators, and this has provided better care for the patient.

It has been my experience from careful observation that once an intern has been started properly in his work, he will continue to give universally acceptable service; on the other hand, should he get into bad habits during his first week he will probably retain them during his entire internship.

The details of each of the above-mentioned lectures and demonstrations, as well as an outline of duties, responsibilities, rules, regulations and other miscellaneous details relating to the hospital and medical practice, have been compiled in book

*The above procedures are done by senior interns, assisted by a nurse, on actual ward work.

†X-ray films are employed to demonstrate proper and improper techniques.

form. This manual is a compilation of about one hundred and forty mimeographed pages and may be referred to as the "Hospital Bible," since it covers everything. A copy of this book is given to each of the new interns for future reference.

PROGRAM OF INSTRUCTION AND EDUCATION

Wards

On the wards the intern service should be a rotating one, and no attempt should be made to turn the intern out qualified either as an internist or surgeon, although he may assist at operations and do an ordinary uncomplicated surgical case.

Ward Rounds and Bedside Teaching

Bedside work and routine ward rounds with his chief and associates should be the highlights in the day's work. Here the main concern should be differential diagnosis and treatment and the intern should be made to familiarize himself with the ophthalmoscope, auroscope and such other diagnostic apparatus and measures as are ordinarily used by the general practitioner. At this time the chief of service should review the record and make such comments and corrections on the charts as are necessary.

Laboratory Work

In the laboratories the intern should not be regarded as an employee and burdened with the time-consuming repetitious work better done by paid technicians; rather he should be expected to follow up the blood, urines and pathologic specimens of the cases to which he is assigned.

Lectures

A definite course of lectures on various subjects is highly important and definitely welcomed by the intern group. Practical lectures are given on forty Wednesday afternoons during the year on the common necessary things a doctor should know. These are given by members of the attending staff and prominent men in medicine in New York and other cities. The topics are chosen by the interns, and a partial list follows:

- Interpretation of the fundus of the eye in relation to general medicine
- Present status in the treatment of cancer
- The relation of neurology to medicine
- Treatment of common diseases of the biliary tract
- Treatment of common ear, nose and throat conditions
- The relation of public health to the practice of medicine
- Office treatment of urologic conditions
- Medical ethics
- The relation of psychiatry to medicine
- Some practical aspects of allergy
- Discussion of fundamental principles in the treatment of fractures

- Chronic arthritis
- Prenatal and postnatal care; home deliveries
- Cultural aspects of medicine
- Medical jurisprudence
- Early diagnosis of brain tumor
- Physical agents in the treatment of disease
- Low-back pain
- Treatment of heart failure
- The roentgen appearance of the normal lung and its variations
- Treatment of hand infections
- Practical prescription writing
- Therapeutics and menstrual dysfunctions
- Diagnosis and treatment of commonest skin conditions
- Practical points in pediatric practice
- Infant feeding
- Communicable diseases of the central nervous system and their public-health aspects
- Orthopedic appliances: indications and use
- Surgical emergencies
- Diseases of the oral cavity of interest to the physician
- Medical emergencies
- Modern methods of diagnosis and treatment of the common arterial diseases
- Anesthesia (surgical, obstetric and office)
- Blind diseases
- Allergic dermatoses
- Acute infections of the urinary tract
- Head injuries
- Facilities the board of health offers to the practicing physician and his obligations to the board of health
- Treatment and management of rheumatic heart disease in children
- Complications of diabetes: treatment

Departmental Conferences

The departments of pediatrics, obstetrics and gynecology, medicine, surgery, pathology and x-ray have their weekly and monthly conferences and regular rounds, at which the intern receives instruction. Interns and residents present reviews of histories, diagnosis and treatment, and these are further discussed by the attending staff.

Every casualty is minutely studied to detect an error in either judgment or procedure.

Weekly Clinical Conferences for Interns

The Educational Committee of the House Staff arranges weekly conferences for interns, consisting in the presentation of interesting cases throughout the institution. An attempt is made to correlate the clinical, roentgenologic and pathologic findings. The presentations afford a kind of forum for our young and ambitious interns in preparation for future academic endeavor and expression.

Current Literature

Interns and residents meet once a week in the hospital library and review the current medical literature. In this way the intern is given an opportunity to speak before his colleagues, to think quickly while on his feet and to address groups

of people. Therefore, he not only acts in the capacity of pupil all the time but as teacher on occasions.

The library has a full-time librarian and contains the most recent books as well as outstanding foreign and domestic journals. No hospital should be without a workable medical reference library.

Responsibilities of the Attending Staff

The intern should be given an opportunity to attend lectures, conferences and follow-up clinics, which are held in the various divisions of the hospital. During these activities the members of the attending staff should function as members of a teaching staff and should be charged with the responsibility of developing and continuing the training of the interns.

Medical Ethics, Local Laws and General Behavior

Another essential of the intern's training is to impress on him those intangible qualities that, although not often spoken of, are nevertheless of great importance. To teach him the relation between himself and the other employees, no matter how humble their station, the confidential nature of all the information he gains about a patient's condition, his proper status with relation to physicians in private practice, local laws pertaining to contagious diseases and medical examiners' cases, the question of gratuities and other ethical problems, are all matters of great importance.

Recreation

The recreational side of the intern's life is frequently overlooked, yet in view of the exacting demands made on him this should be considered an essential provision. The intern's quarters should be sufficiently isolated so that he may feel free to relax. A radio, card table, piano and, if space permits, a billiard table should be provided. For outdoor recreation a tennis or handball court—or both—is beneficial. A quiet corridor and an individual room, affording privacy, are factors for consideration.⁵

SUMMARY

Under the plan that I have outlined the intern has been trained in taking good histories and making thorough physical examinations, and has developed the art of medical logic in drawing conclusions. He has had basic training in the use of the fluoroscope, diathermy, basal metabolism and electrocardiographic equipment, and has been instructed in the interpretation of x-ray films, fluoroscopic examination and electrocardiographic readings. He has received instruction in the treat-

ment of hay fever, injection of varicose veins, treatment of common skin conditions, office gynecology, proctology and the care of the diabetic patient. He has also been instructed in medicine, surgery, obstetrics, pediatrics and related specialties.

It may be said that the form of internship recommended is a well-rounded and practical one, fostering confidence, reliability and self-assurance to assume the responsibilities of general practice. It is a source of gratification for a hospital to know that it has trained the intern adequately, and this can be done by proper study and development of a schedule similar to the one recommended.

In summary, it may be said:

There should be careful and intelligent supervision of the intern staff by the superintendent, his assistant or another executive officer, who by experience is fitted to handle the training of the intern and who is clothed with sufficient authority to effect it.

The hospital must develop practical doctors who will know what to do with the type of case they are most likely to meet.

The attending members of the staff of a hospital—although they may not be connected with an outside teaching institution—should function as teachers and should be charged with the responsibility of developing and continuing the education of interns.

All appointments to the medical and surgical staffs of a hospital should be based on merit.

The intern must be trained in doing things; if he is merely told or if he only reads, his training is inactive and hence remains on the informational basis. He will be apt to fail to acquire the practical skill or the impulse to try things needed by the general practitioner.

The Outpatient Department should play a clinical role in the education of interns. Its importance is surely sufficiently obvious; to a considerable extent the ambulant patient manifests the process of disease closer to its onset than the patient in the wards does. No small proportion of the young physician's patients will be persons who complain of aches and pains before they are forced to take to their beds.

The quality of medical service and intern teaching entails dual responsibility. It depends on interest shown both by the administration and by the medical staff.

The organization and proper utilization of the intern's time is essential in order that he may derive the necessary benefits and opportunities the hospital has to offer.

The hospital should prepare a well-organized intern program in the form of lectures and dem-

onstrations to be given to the interns at the commencement of their internship, and to cover such subjects as rules and regulations of the hospital, social service, diets and practical demonstrations of medical procedures, nursing procedures and surgical technics.

Systematic practical lectures, didactic and expository in character should present to the intern comprehensive surveys of medicine, surgery and other clinical branches.

The various medical, surgical and specialty divisions in the hospitals should make regular rounds and should hold weekly and monthly

conferences, in which the interns should be encouraged to participate.

168th Street at Gerard Avenue

REFERENCES

1. *Intern Education and Supervision*. A pamphlet compiled by a joint committee of the Committee on Medical Education of the Ontario Medical Association, the Committee on Medical Education of the Canadian Medical Association and the Department of Hospital Service of the Canadian Medical Association 44 pp. Toronto Canadian Medical Association
2. Smith, N. Training the intern in a municipal hospital model intern schedule is presented *Hospitals* 12 95 100, 1938
3. *Idem*. Practical utilization of an out-patient department in the training of interns *Tr. Am. Hosp. A.* 38:440-443, 1936
4. Giddings, E. and Smith, N. Practical advice in training of interns *Hospitals* 10 37 40, 1936.
5. Smith, N. Training of the intern *J A M A* 114 1:705 1708, 1940

THE USE OF SILK IN INFECTED WOUNDS*

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BOSTON

WE PRESENT this paper on the use of silk in infected wounds as a contribution to surgical technic. The title may well provoke immediate criticism, since even the ardent advocates of "silk" surgery have condemned its use under these conditions. But as the years have passed, one of us (E. C. C.) has given up entirely the use of catgut, because even under the condition of infection, healing has been better with silk, and hernia and evisceration have been lessened.

The advantages of using fine silk instead of catgut for sutures and ligatures in clean wounds have been demonstrated conclusively by many investigators.¹⁻⁶ Fine silk is cheaper. It is more easily and reliably sterilized. It produces less reaction in the tissues, and it results in a stronger wound. Its use imposes on the operator a more exacting technic, which is invariably followed by fewer wound complications. When silk sutures are used, wounds are less painful, and the period of hospitalization is often shortened. Investigations from this clinic in the fields of hernia⁵ and thyroid⁴ surgery have clearly supported this point of view. Infection, wound reaction and recurrence of the hernia have been lessened in our clinic by its use. The sole disadvantage of silk is that it is nonabsorbable and hence may act as a foreign body. For this reason its use in infected wounds is not generally advocated, and many surgeons hesitate to use it in clean wounds because occasionally slight long-continued suppuration and a draining sinus may develop.

Although it is true that silk is nonabsorbable in the sense that catgut is absorbed, under certain circumstances it may be completely removed from the tissues without being extruded from the wound. This is accomplished by fragmentation of the silk fibers and by inclusion of the fragments within mononuclear phagocytes. That silk may be absorbed in this fashion was shown years ago by Foot.⁷ The process by which this is achieved is shown in Figures 1 and 2. To promote absorption the silk should be composed of small fibers, twisted rather than braided, and either unwaxed or waxed very lightly. So-called "serum-proof" silk is not so easily fragmented and hence is more likely to act as a persistent foreign body and to be extruded from the wound in the presence of infection.

In sharp contrast to the common belief that silk should not be used in infected wounds, an opinion shared by some surgeons⁸ educated to the use of silk, is the curious acceptance by a large number of capable surgeons of the fact that in the field of alimentary-tract surgery, both gastric and intestinal, silk is the preferable suture material. Obviously all such cases are potentially, if not actually, the seat of infection. Halsted's⁹ clear demonstration of the superiority of silk in large-bowel surgery lent a major impetus to this point of view. In a later paper¹⁰ in commenting on the use of silk in infected wounds, Halsted wrote: "If fine silk were used and the infection slight, probably none of the buried threads would be extruded, nor would healing be delayed demonstrably on account of their presence." And very recently, following the publication of a book by one of us (E. C. C.¹¹), a letter came from a gynecologic colleague, who

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surprised us by saying that the book was satisfactory except for the section on gynecology. Here, he said, we made the mistake of changing from silk to catgut, for in a long career he had proved to himself the great superiority of silk in all types of gynecologic procedures.¹²

an animal's abdomen. These were then contaminated with equal amounts of a well-shaken bacterial culture, and closure was performed using silk in one wound and catgut in the other. It was found that only 50 per cent of the silk wounds suppurred, whereas 100 per cent of the catgut



FIGURE 1.

This photograph shows a silk suture buried four months previously in a highly infected wound in the abdominal wall of a dog. Note the perfect healing, without extrusion of the silk.

The knowledge that under certain circumstances silk may be absorbed from the tissues, and the experience of one of us (E. C. C.) who has used silk for years in the presence of infection, led to a comparative study of the healing under controlled conditions in the laboratory of infected wounds sutured with silk and with catgut.¹³ Under sterile conditions parallel wounds were made in

wounds opened and discharged a purulent exudate. Moreover, the infection in the catgut wounds always appeared earlier and was severer. Healing occurred at about the same time in silk wounds that opened as in the corresponding catgut wounds. No persistent sinuses developed. Although some of the silk sutures were extruded from the wounds, healing occurred without delay

and without the removal or discharge of all the sutures. This was not true if heavy silk or continuous sutures were employed. Under these circumstances, all the silk often had to be removed from the wound before healing was complete.

Fortified by these laboratory investigations, but with no expectation of bringing adherents to this point of view, we present certain observations on



FIGURE 2

This photograph shows several strands of a twisted silk suture buried six months previously in a highly infected wound in the abdominal wall of a dog. Note the fragmentation of the silk fibers and the continued presence of some phagocytes which are persisting in their attempts to break up further the foreign body. This wound, though grossly infected, discharged no sutures.

the use of silk in potentially infected and grossly infected surgical conditions. In our opinion, the results with this material are superior to those previously obtained with catgut. However, before presenting the material let us state clearly that the silk used is fine black silk (No. 4 Gudebrod, which breaks at 4 pounds' tension) and that the greater the infection, the less numerous the sutures used.

The technic generally followed in our clinic is to close the peritoneum by a continuous silk su-

ture, single strand, which accurately approximates peritoneum to peritoneum. In placing this suture, meticulous care is taken to incorporate the transversalis fascia with the peritoneum. When a wound must be drained, an interrupted suture is always placed at each side of the drain so that this foreign body does not rest against the continuous suture. When the wound is grossly infected, once the peritoneum is closed, the layers are closed by interrupted Lembert sutures of fine silk. These are placed in long abdominal wounds in the fascia, not more than 6 mm. apart, and in the fatty layers in sufficient number to approximate the tissue and build up the wound by obliterating any dead space. If the wound is grossly contaminated, skin sutures are not placed, for if there is a small amount of infection and the skin is not closed over it, the wound will heal well without breaking down.

The realization that silk may be superior to catgut, even in infected wounds, has come slowly. Recognizing its advantage in alimentary tract surgery, we were led naturally to its use in both chronic and acute cholecystitis. Next came its employment in pelvic surgery, both in potentially infected cases and in gross infection with tubo-ovarian abscess. Once the success of repair was demonstrated in such cases we accepted silk as the superior suture material in all wounds, and have recently utilized it in all forms of surgery involving infection, including infected pilonidal sinus, infected hands and acute suppurative appendicitis.

The material that we are presenting includes studies in biliary tract and alimentary tract surgery, surgery of the large bowel, gynecology and suppurative appendicitis. The results obtained in these fields by the use of fine silk suture material are better than we have been able to obtain with the use of catgut. As others have repeatedly emphasized,—notably Whipple,⁶ who has been won over to the use of silk by clinical trial, although for years he had been opposed to it,—the type of surgical technic demanded by those who use fine silk may contribute to these results quite as much as the material employed. It is our hope, as Allen,¹⁴ of Australia, puts it, that the "fetish" of catgut may be somewhat dispelled by these observations.

Table 1 summarizes the material presented. It by no means covers all types of surgery in which we use silk, but demonstrates the common fields for surgical endeavor. Many surgeons use silk for biliary, gastric and large bowel surgery, and yet are appalled by the suggestion that it can be utilized in more serious infectious conditions. This is a peculiar paradox, for there is no more seri-

ous danger to a surgical wound than bowel contents, and in spite of so-called "aseptic" methods in large-bowel surgery a considerable percentage of wounds are contaminated. Sutures were discharged in 7 per cent of our cases, but the amount of wound infection and the small incidence of hernia, occurring only about colostomy openings, are favorable omens. All wounds under the heading "suppura-

TABLE 1. Summary of All Material Studied.

TYPE OF SURGERY	NO. OF CASES	CASES WITH WOUND INFECTION	CASES WITH DISCHARGED SUTURES	CASES WITH HERNIA
Biliary surgery.....	100	4	6	0
Chronic cholecystitis..	63			
Acute cholecystitis..	37			
Gastric resections	45	0	0	0
Large-bowel surgery.....	43	3	1	2*
Hysterectomy	20	0	1	0
Operations for suppurative appendicitis	55	16	10	0
Totals	263	23	18 (7%)	2

*1 colostomy; 1 Mikulicz procedure.

tive appendicitis" are listed as infected, for bacteria unquestionably invade the wounds of all such patients.

Table 2 covers the first division of surgery, that of the biliary tract. Even under the conditions of chronic cholecystitis, some bacteria are almost invariably present in the biliary passages. In 3 per cent of the cases of chronic cholecystitis, silk sutures were discharged from the wound, and

TABLE 2. Biliary Surgery.

DATA	NO. OF CASES
Chronic cholecystitis and cholelithiasis	
Operations	63
Wound infection	0
Tender wounds	3
Silk sutures discharged*.....	2 (3%)
Hernia	0
Acute cholecystitis and cholelithiasis	
Operations	37
Wound infection	4
Tender wounds	2
Silk sutures discharged†.....	4 (11%)
Hernia	0

*One case for 6 mo.

†Two cases for 6 mo., 2 cases for 8 mo.

in 11 per cent when we were dealing with an acute infectious condition. In the latter group, sutures were discharged for as long as six to eight months, but there were no cases of hernia or disruption, and none of the wounds were seriously involved by infection.

Table 3 refers to gastric surgery, including surgery of the duodenum. Here, at least in the cancer cases in which hydrochloric acid was absent, there was gross contamination in the wounds, yet

in no case was there the slightest trouble with the wound — infection, hernia or the discharge of silk sutures.

Table 4 deals with large-bowel surgery, in which we have not resorted to the use of so-called

TABLE 3. Gastric Resections.*

DATA	NO. OF CASES
Operations	45
Wound infection	0
Tender wounds	0
Silk sutures discharged.....	0
Hernia	0

*Thirty cases of cancer; 15, of ulcer.

"aseptic anastomosis," believing that fatal peritonitis following bowel surgery is always due to a gross leakage from the suture line rather than to contamination occurring at the time of operation.¹⁶ Extreme care is taken in preparing the bowel wall for the suture line. The portions of bowel are divided by the cautery between Payr clamps, and extrusion of the bowel contents when the

TABLE 4. Large-Bowel Surgery.*

DATA	NO. OF CASES
Operations	43
Wound infection	3
Tender wounds	0
Silk sutures discharged.....	1 (2%)
Hernia	2†

*Thirty-two cases; 24 involving the colon; and 8, the rectum.

†1 colostomy; 1 Mikulicz procedure.

clamps are removed is prevented by a soft, spring-blade enterostomy clamp placed distal to the suture line; moreover, the field is always kept completely walled off. In this group 2 per cent of the wounds discharged some silk sutures. In 2 cases hernia developed, in one about a colostomy open-

TABLE 5. Hysterectomy.*

DATA	NO. OF CASES
Operations	20
Wound infection	0
Tender wounds	0
Silk sutures discharged.....	1 (5%)
Hernia	0

*Fifteen cases, supravaginal; 5 cases, total.

ing, in the other about a Mikulicz procedure; in each of these operations the discharge of fecal contents usually, but not always, seriously contaminates the wound.

Table 5 covers the field of gynecology; here also, in a wound closed without drainage, some silk sutures were discharged. However, the usual course of the convalescence was so smooth that we

have become better satisfied with silk closure than with catgut. In this field, opening the vagina or amputating the cervix may expose the wound to infectious material.

Table 6 presents a thorough study of 55 cases of acute suppurative appendicitis, including 25 of perforated appendicitis with diffuse peritonitis, 20 of gangrenous appendicitis with purulent fluid and

TABLE 6. *Operations for Acute Suppurative Appendicitis.**

DATA	No. of CASES
Operations	55
Drained wounds	5
Wound infection	16
Prompt healing	39
Delayed healing (2 mo. or more)	14
Silk sutures discharged	10 (18%)
Hernia	0

*Twenty-five cases, perforated; 20 cases, gangrenous; 10 cases, with abscess.

local peritonitis and 10 of appendicitis with abscess formation. In all cases positive cultures of *Escherichia coli*, nonhemolytic streptococcus or enterococcus were recovered at the time of operation. In only 5 cases was drainage of the peritoneal cavity used. All the patients were operated on through a right oblique muscle-splitting incision. In 5 cases the peritoneum was closed with a continuous suture of fine silk; in the remainder it was closed with a continuous suture of catgut. In all cases the muscular and fascial planes were closed with interrupted sutures of fine silk. It is our practice to close the upper layers of the abdominal wall very loosely when gross infection is present. In 20 cases the fat and skin were left open, and the wound edges were packed lightly with gauze impregnated with vaseline, or were covered with sponges wrung out in physiologic saline solution.

In 39 patients the wound healed promptly over periods varying from twelve days to four weeks, the average being about twenty days. In no case was the use of silk responsible for prolonging the hospital stay. In 2 cases the continuous silk suture used in the peritoneum was discharged before the sixteenth postoperative day. Had this suture not been extruded, it is possible that healing might have been delayed. There were 14 cases of delayed healing. Of these, 6 healed within three months and gave no further trouble; in 2 the wound did not finally close for six months. Four other patients, although the wound healed promptly, continued to have trouble with occasional reopening of the wound and discharge of sutures; this continued in 1 case for six months, and in the other for a year.

Only 2 of the 14 patients were seriously incapacitated because of continued trouble with

the wound. One patient was operated on again, and a chronic sinus tract was excised; no silk was found. This wound had been drained at the time of operation, and it is impossible to say whether or not the silk used was responsible for the faulty healing. In the other 12 cases of delayed healing the patients appeared to suffer no great distress. Only 4 had to return for dressings after discharge from the hospital; in the others the wounds healed promptly but continued to break open with the occasional discharge of a suture. This caused no great inconvenience to the patients and in no way interfered with the strength or final cosmetic appearance of the wound. It is fair to state, therefore, that in 55 cases of acute appendicitis in which fine silk was used, only 2 patients suffered serious distress from the use of nonabsorbable sutures. The majority of the wounds healed promptly and well, in spite of gross contamination, and none of the patients developed a postoperative hernia.

Lastly, the statistical data show that in the presence of gross infection wounds heal much better with less reaction and less tendency to break down when the skin is not closed. Table 7 shows that in

TABLE 7. *Operations for Acute Suppurative Appendicitis: Comparative healing of silk wounds with and without skin-closure.*

TYPE OF CLOSURE	No. of CASES	CASES WITH DELAYED HEALING
Primary closure	35	12 (34%)
No sutures in skin or subcutaneous fat	20*	2 (10%)

*The more seriously infected.

infected wounds when the skin is closed, the percentage of delayed healing rises abruptly; whereas when no sutures are placed in the skin, there is no delay in healing. This is a technical point of some importance.

During the period of this study catgut was used throughout the wound in 18 cases of acute suppurative appendicitis. Table 8 compares the

TABLE 8. *Operations for Acute Suppurative Appendicitis: Comparative healing of infected wounds sutured with catgut and silk.*

TYPE OF SUTURE	No. of CASES	CASES DRAINED	CASES WITH PROMPT HEALING	CASES WITH DELAYED HEALING	CASES WITH DISCHARGED SUTURES	CASES WITH POST-OPERATIVE HERNIA
Silk	55	5	39	14	10	0
Catgut	18	5	16	1	2	3*

*Only 1 of these was drained.

healing of such infected wounds sutured with catgut and with silk. Ten of the catgut wounds were in cases with perforation, 4 with abscess and 4 with gangrene and local peritonitis. Sixteen healed promptly, but the average period of healing

was slightly longer than that for the 39 silk wounds that healed promptly. In 1 catgut wound healing was delayed for three months, at the end of which time a catgut suture was removed. In another the wound healed well, but one year later a superficial abscess developed and a small knot of catgut was discharged. Of more significance is the fact that in this group of 18 patients there were three postoperative hernias and a weakened abdominal wound, with a broad scar but no definite hernia. Five cases in this group were drained, but only one of the hernias developed in a drained wound.

It is our impression that some factor other than infection plays a role in the discharge of non-absorbable sutures. We say this because of the great frequency with which grossly infected wounds heal without discharging sutures, and because of the occasional clean wound in which no suppuration develops but from which nonabsorbable sutures are sometimes repeatedly discharged. The placing of such sutures too close to the skin favors their discharge from clean wounds. The possibility that allergy to silk might play a part has been investigated, but we have found no case of sensitivity to this foreign protein in the silk sutures in a series of 6 patients whose wounds repeatedly discharged silk. In the present state of our knowledge it must be said that a few patients do not tolerate foreign bodies in the tissues, and that regardless of infection silk sutures may be discharged.

DISCUSSION

It is not our intention to advocate the widespread use of silk in infected wounds. However, this study demonstrates that silk can be used in the presence of infection without the disastrous results that are often attributed to it, and with certain advantages that merit consideration. The degree and severity of the inflammatory reaction are less when silk is used. This statement is based on laboratory evidence and on a clinical impression gathered from the present study. The degree of infection in the immediate postoperative course was less. Moreover, silk wounds are stronger. In the presence of infection catgut is often rapidly absorbed, whereas silk, despite suppuration around it, continues to hold the tissues together. This is an observation that we have made repeatedly in both the laboratory and the clinic. Consequently one may expect fewer hernias in infected wounds when silk is used. In the presence of infection, when minimizing the degree of suppurative infection and maintaining a strong

wound are of great importance, silk is preferable to catgut. Thus in an elderly patient after resection of the colon, even though contamination of the wound may seem likely, the use of silk will not only reduce the likelihood of suppuration but also ensure a stronger wound, with less danger of either evisceration or hernia. The discharge of a suture from the wound in such a patient is a small price to pay for superior healing.

CONCLUSIONS

Material is presented from the major fields of surgical endeavor in which infection is commonly to be expected and in which small silk sutures have been used. The evidence in this series agrees with that of controlled laboratory experiments in indicating that in infected wounds the use of fine silk sutures instead of catgut sutures, results in a more permanent and solid healing. The results also reveal that in some cases, even when healing has been complete, the extrusion of silk sutures may continue. The factor leading to this extrusion is not solely the amount or type of infection. In our opinion silk may be used with value in certain surgical fields when infection is present.

REFERENCES

1. Dunphy, J. E. and Botsford, T. W. The use of silk in thyroid surgery. *Surg., Gynec. & Obst.* 69:441-445, 1939.
2. Meleney, F. L. Infection in clean operative wounds: 9 year study. *Surg., Gynec. & Obst.* 60:264-276, 1935.
3. Miller, G. and Luke, J. C. Silk technique: its role in wound healing. *Canad. M. A. J.* 38:358-362, 1938.
4. Puestow, C. B. Comparison of the use of catgut and silk in thyroid surgery. *S. Clin. North America* 20:241-247, 1940.
5. Shambaugh, P. Postoperative wound complications: clinical study with special reference to use of silk. *Surg., Gynec. & Obst.* 64:765-771, 1937.
6. Whipple, A. O. The use of silk in the repair of clean wounds. *Ann. Surg.* 98:662-671, 1933.
7. Foot, N. C. Studies on endothelial reactions. V. The endothelium in the healing of aseptic wounds in the omentum of rabbits. *J. Ex. per. Med.* 34:625-642, 1921.
8. Howes, E. L. A renaissance of suture technique needed. *Am. J. Surg.* 48:548-552, 1940.
9. Halsted, W. S. Circular suture of the intestine: an experimental study. *Am. J. M. Sc.* 94:436-461, 1887.
10. *Idem.* Ligature and suture material. *J. A. M. A.* 60:1119-1126, 1913.
11. Cutler, E. C. and Zollinger, R. *Atlas of Surgical Operations*. 181 pp. New York: Macmillan Co. 1939.
12. Burke, J. personal communication.
13. Shambaugh, P. and Dunphy, J. E. Postoperative wound infections and the use of silk: experimental study. *Surgery* 1:379-385, 1937.
14. Allen, J. C. B. Fetish of catgut. *M. J. Australia* 2:150, 1934.
15. Shambaugh, P. Peritonitis as a factor in the mortality of gastrointestinal surgery. *Ann. Surg.* 104:382-387, 1936.

DISCUSSION

DR. ROBERT R. BALDRIDGE, Providence, Rhode Island: The paper by Drs. Cutler and Dunphy is certainly fascinating and daring. I am glad that they have not advocated the use of silk in infected wounds by the general surgical public, for such a recommendation by such eminent authors might well result in the return of the crochet hook to the place of prominence it once held in the surgeon's armamentarium. I do not believe that such excellent results as the authors report could be obtained except

by master technicians—master surgeons—working under the most favorable circumstances

It is a question in my mind whether such technic could be applied in a general hospital, for example, where the surgical teams change every few months. As Dr Whipple has pointed out the use of silk in clean wound surgery requires special training and I believe that its use in infected wounds could be undertaken only by such men who have had previous training and are skilled in the employment of silk in clean wounds.

Hilsted's principles of sharp-knife dissection careful hemostasis, avoidance of tension and of mass ligatures, use of the finest suture material and the avoidance of all unnecessary trauma would certainly be more necessary in an infected than in a clean wound.

At the Rhode Island Hospital we do not yet dare to use silk except on rare occasions, even in clean wounds although, as the authors have pointed out, we have no hesitation in adopting it in gastrointestinal surgery. At first glance this may appear inconsistent. The well known powers of resistance of the peritoneum, as compared with those of muscle fascia or fat however, probably explain at least in part, the freedom from complications.

A proper discussion of this paper must include the subject of wound healing in general. It should be emphasized that many factors aside from the suture material used determine whether or not a given wound will heal well. In addition to the fineness, strength and blandness of the suture material, we must consider the nature of the wound, the character and virulence of the bacteria, the skill and experience of the surgeon and the condition of the patient as well as that of the wound. The presence of dehydration, hypoproteinemias, avitaminosis, anemia, old age or chronic disease may interfere with healing in the most skillfully sutured incisions, and conversely, as we all know, most wounds heal without infection regardless of the suture material used provided the patient is in good general health and his surgeon reasonably skillful.

I should like to ask the authors if they will elaborate their meaning of the word infection as opposed to contamination. I have operated as we all have on a great many patients with peritonitis. There is infection within the peritoneal cavity, but there is not infection within the wound. When we sew up such a wound we are unquestionably repairing a contaminated wound. The cleanliness of all wounds however, is only relative and as Ives and Hirschfeld and others have shown bacterial contamination may be demonstrated in as high as 90 per cent of all so-called clean wounds. I bring up this point to emphasize that it is the degree of contamination and the virulence of the infecting organism, not the fact that they are present which we must consider. Would not The Use of Silk in Contaminated Wounds be a more exact expression of the meaning of the authors?

DR CLAUDE C KELLY, Hartford, Connecticut. I was trained in the surgical technic used in Baltimore and was told that many surgeons had abandoned the use of silk sutures in the presence of infection because they had later removed silk from wounds. Silk does not have to be braided or thick to result in extrusion and infection. I recall a case in which a piece of silk was extruded on reopening a wound a year after operation, the wound then healed at once.

I formerly used silk in the ligation of all the vessels in radical breast operations until on excising the mass in a few suspected recurrences I found within it a silk ligature and a drop of pus. There was nothing in the wound to indicate infection.

Judging from what Dr Cutler has said, I was wrongly trained in the use of silk, and it is remarkable that the results he describes were obtained. However, I believe that silk should not be used by surgeons inexperienced with it, especially in infected wounds.

One error in the employment of silk sutures is that of leaving long ends beyond the knots. Leaving some of the skin open has proved valuable in many infected wounds. Collier tells of using wire instead of silk, and of leaving wounds open from twenty-four to forty-eight hours. He obtained the best results when the wound had been left open for twelve to twenty-four hours.

The results which Dr Babcock has obtained with wire have been excellent, so far as I have been able to note. I also have used it, but I am sure that fewer of my patients would have hernias today if I had employed silk. Nevertheless I do not believe that at this time it should be used indiscriminately.

DR CUTLER (closing). Dr Baldridge wrote me before this meeting to remind me that when his group of students worked in the dog laboratory they closed all layers with catgut. That was a good point. It represents the fact that in twenty-five years I have persuaded myself, if no one else that my results in all fields of work are better with silk than with catgut.

I appreciate fully the point emphasized by Dr Kelly that the technic is more important than the suture material. Fine silk breaks if the surgeon is rough. This has been emphasized repeatedly not only by Dr Hilsted in the early days but also by Allen Whipple, of New York City, who has been completely won over to the use of silk suture material in our own time. We often demonstrate to our house staff the superiority of silk over catgut by having the same operator utilize silk on one side and catgut on the other in the repair of a double inguinal hernia. One always finds more reaction in the catgut wound. The ideal conditions for perfect wound healing, which is the minimum reaction, are to be found when silk is used, although the operative technic of course plays a part.

Dr Kelly has objected to having to remove silk knots which are occasionally discharged even in uninfected clean wounds although he admitted that he might have fewer hernias if he used silk throughout. I may have a different point of view, for I would rather lay myself open to criticism from a patient who thought there was something wrong with the wound than have him undergo a secondary operation for hernia.

That foreign bodies can be tolerated in wounds we know well. In 1938 when I attended a surgical meeting in Brussels I spent a day and a half with Roux Berger at one of the great hospitals in Paris and to my consternation saw him bury French silkworm gut in wounds yet the wounds healed very well.

As to contamination I agree with Dr Baldridge that it is a matter of degree. The breaking down of a wound relates to the virulence of the organism and to the resistance of the host. Both these criteria may be altered by the presence of a foreign body.

Your president has said that he hasn't been sold yet on the use of silk. This reminds me of the attitude taken by our graduate students. Each year I give a course in technic to students in the graduate school, and they operate on animals and observe work in the hospital. Every year a number of them are won over to silk after what they experience and see. On their return home they write letters and say that if they use silk they may be the only persons using it in their communities and want to know whether if the silk sutures come out I will be willing to come and testify that it was a proper procedure.

EXPERIENCE WITH FEMORAL-VEIN LIGATION FOR PROPHYLAXIS OF POSTOPERATIVE PULMONARY EMBOLISM*

JOHN B. SEARS, M.D.†

BOSTON

UNTIL the enigma of postoperative thrombosis is solved, surgeons must be concerned with the prevention of pulmonary embolism. This is a report of the experience of the surgical staff of the Beth Israel Hospital during the last half year with 10 cases of deep peripheral venous thrombosis for which either the popliteal or femoral vein was ligated as a prophylaxis against embolism.

In recent years Homans¹⁻³ has written a great deal about thrombosis of the deep veins in the leg, and has stressed the sinister relation between bland thrombosis and pulmonary embolism; the cases reported by him were all ambulatory and were associated with minor injury or strain. All our cases occurred after operation.

This presentation is not concerned with the more familiar condition of iliofemoral thrombophlebitis (milk leg) and peripheral thrombophlebitis. In these there is likely to be an inflammatory reaction in the vein wall, a more marked clinical reaction, an adherent thrombus and, thus, less danger of embolism.

The syndrome now to be discussed is more treacherous. Clotting apparently begins within the veins among the calf muscles and may progress rapidly to the femoral region—or even higher. It is the loosely attached thrombus or its free-floating propagating tail that breaks off and journeys so dramatically to the heart and lungs.

The onset is usually mild and insidious, with little or no change in the chart. The patient sometimes complains of pain in the leg, usually in the calf region, occasionally in the heel. The pain varies in intensity from slight to severe discomfort. One of our patients, after an infarction, admitted mild pain in the calf of four days' duration, but had never complained of it to the house officers. The duration of the pain likewise varies. In most patients it lasts from two to eight days. The leg pain may disappear after several days, only to be followed by embolism or by pain in the femoral region, which signifies extension to the femoral or iliac vein.

On physical examination one finds tenderness on deep palpation of the calf muscles, and force-

ful dorsiflexion of the foot causes pain in the calf or popliteal region (Homans's² sign‡). A swelling of the leg or slight edema over the shin and ankle may occur while the patient is in bed—in 2 cases in our group of 10—and may be related to an inflammatory reaction. Cyanosis, even temporary, is rare. We have found no impressive evidence of sympathetic hyperactivity and have not done lumbar novocain injections.

In this series of 10 cases the sexes were equally divided. The ages varied from thirty-five to seventy, the average being fifty-one years. Ninety per cent occurred in the right lower extremity. The complication was associated with no particular type of surgery, having followed biliary-tract operations in 4 cases, hernia operations in 2 and operations on the stomach, on the colon, for ruptured intervertebral disk and for a gynecologic condition in 1 each.

The first manifestation of pain in the calf in this group appeared five to fifteen days after operation, the average being 11 days. The diagnosis of deep thrombosis was made after infarction or embolism in 3 cases.

I believe that deep thrombosis in the calf occurs more frequently but is less often recognized than iliofemoral thrombosis, and that the former is the more frequent source of pulmonary embolism. The diagnosis is obviously difficult in many cases, and is almost impossible in others.

Fortunately, deep thrombosis does not usually result in embolism. But because it may, and because we have witnessed several fatal embolisms during a waiting period of indecision, it is now our policy to divide and ligate the femoral vein as soon as possible after making a diagnosis of deep thrombosis in the leg. The vein is divided even if the diagnosis is made after infarction or embolism has taken place, for the accident is likely to recur.

Division of the vein removes the danger of embolism and prevents extension of the thrombotic process beyond the operative site. From the viewpoint of convalescence, the patient becomes ambulatory earlier. In our series the femoral vein was divided in 8 cases, the popliteal in 2.

The operation is performed under novocain infiltration, and a vertical 10-cm. incision is made in the femoral triangle over the femoral impulse. The

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‡"There is a sense of discomfort when the tendo Achillis is put upon the stretch by forced passive dorsiflexion of the foot. The discomfort is felt back of the upper calf and knee."

artery is exposed, and the vein is found under it in the upper part of the wound. Several large tributaries, including the profunda vein, are usually seen. The following conditions may be present:

The vein may appear and feel normal. A silk ligature is tied just distal to the profunda vein, or any other large tributary, and the vein is opened below this point. The amount and speed of hemorrhage should be some indication of the extent of venous occlusion. In some of these patients, I have injected an opaque solution (Diodrast) into the distal end of the severed vein in an attempt to visualize the upper end of the thrombus by immediate x-ray films. Usually a section of the vein was removed for microscopic study.

The vein may contain a soft unattached thrombus. This is gently removed with a suction tip introduced through a small longitudinal incision.

The vein may be firmly thrombosed and may be surrounded by inflammatory exudate. In this situation the operation is without prophylactic value. Since this thrombophlebitis is considered the source of a vasospastic reflex,^{4, 8} which is one of the most important factors in the production of the clinical manifestations, a portion of the involved vein should be resected.

Homan's sign, when present, has persisted from two to six days after operation and in fact may become more intense. The temperature and white cell count may also rise after operation. Once the diagnosis has been made the extremity is elevated, and this position is maintained after operation. If there are no general contraindications, I permit the patient to get out of bed in a few days, and I have advised the subsequent use of woven bandages because of the tendency to slight swelling in ambulatory cases.

CASE REPORTS

CASE 1 M C (B I H 50003), a 70-year old man, was operated on for an incarcerated inguinal hernia on November 18, 1939. Nine days later he sat in a chair. On the following day, he complained of pain in the right calf. Examination showed deep tenderness and a positive Homan's sign. There was no fever or swelling. The condition was diagnosed as a deep thrombosis, and femoral vein ligation was recommended and refused. On the 12th postoperative day, the temperature rose. Three days later, in searching for the cause of this fever, it was noted that the calf tenderness and pain had disappeared, but distinct tenderness could be made out in the right femoral triangle. There was no edema anywhere. The patient agreed to surgery. The femoral vein was found to be thrombosed and was surrounded by an organizing exudate. A biopsy specimen of the vein was taken. The temperature became normal in 48 hours, and the patient went home 4 days later.

The pathological report (S39 2496) read 'Beginning organization

Comment. This case is of interest because of the sequence of events. The original findings in the right leg were typical of bland thrombosis. Five days later the process had extended to the upper thigh, and was associated with fever but no pain. The operation at this time was without prophylactic value because the thrombus was already retracted to the vein wall at the level of the operation.

CASE 2 C W (B I H 49274), a 35 year old woman, on October 3, 1939, had a cholecystectomy performed under Nupercaine anesthesia. She dangled her legs on the 11th day, and was up in a chair on the 12th. She was discharged afebrile on the 13th day. She was readmitted 2 days later with severe pain in the right calf of 24 hours' duration. Physical examination showed marked tenderness in the right calf plus pain on dorsiflexion. The white cell count was 10,000. She was immediately operated on. Division and ligation of the right femoral vein were done with injection of Diodrast. The pain in the calf persisted for 5 days, and she was discharged 12 days after operation, wearing an Ace bandage. There was no swelling.

The pathological report (S39 2182) read 'Negative vein.'

The x-ray report (79999) was 'Injected fluid stops abruptly 3 cm below the division of the vein below the knee.'

Comment. This patient was a physician who diagnosed her deep thrombosis. The prophylactic ligation afforded great mental comfort and assured early rehabilitation. Four months later she reported slight swelling unless she wore a woven stocking.

CASE 3 H O (B I H 49256), a 47 year old married woman, underwent a cholecystectomy on September 30, 1939, under Nupercaine anesthesia. On the 11th day after cholecystectomy she dangled her legs. That afternoon the temperature rose to 100.2°F, the pulse to 130 and the respirations to 30. There was slight difficulty in breathing. The patient complained of a heaviness over the breast bone, like a cold coming on. The next morning the pulse, temperature and respirations were normal. At 4 p.m. she suddenly went into collapse and was placed in an oxygen tent. The blood pressure was 45/30. She was in shock most of the evening and received oxygen, pipavrine and atropine. The next morning (the 13th day after operation) there was tenderness in the right calf and the patient admitted that she had had some pain there for 4 days. She was taken to the operating room in bed and wearing an oxygen mask. The right femoral vein was exposed and divided. She was discharged well on October 29, 1939, 30 days after the gall bladder operation.

The x-ray report (79866) on October 13, 1939 was as follows: 'Pulmonary infarction.'

Comment. The first infarction was mild but was followed in 24 hours by the severest nonfatal embolism in this series. This might have been prevented if the legs had been examined for deep tenderness. The pain in the right calf had been so moderate that the patient had not bothered to report it.

SUMMARY

Failure to divide deep veins containing bland clots may result in major catastrophes. I believe that some of the operations in this small series prevented embolism and therefore justified those

which may have been unnecessary. Earlier rehabilitation has been the rule.

This experience with a perplexing group of cases is presented in the hope that interest in the problem involved—diagnosis and treatment—will be intensified. Further clarification and evaluation are needed.

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REFERENCES

1. Homans, J. Thrombosis of the deep veins of the lower leg, causing pulmonary embolism. *New Eng. J. Med.* 211:993-997, 1934.
2. *Idem.* Varieties of thrombophlebitis of the limbs: their origin, course and treatment. *Am. J. Surg.* 44:3 16, 1939.
3. *Idem.* *Circulatory Diseases of the Extremities.* 330 pp. New York Macmillan Co., 1939.
4. Leriche R and Kuntin, J. Traitement immédiat des phlébites post-opératoires par l'infiltration novocaïnique du sympathique lombaire. *Presse méd* 42:1481, 1934.
5. Ochsner, A. and DeBakey, M. Thrombophlebitis: the role of vasospasm in the production of the clinical manifestations. *J. A. M. A.* 114:117-124, 1940.

MEDICAL PROGRESS

SYPHILIS

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THE usual large number of articles on syphilis appeared during the past year, many of which cannot even be touched upon in this review. We are entering an era in which the public-health aspects of this disease will play an extremely important part as the armed forces of the nation gather in increasing concentrations in the various camps throughout the country. At the same time, the private physician continues to play a leading part in the detection and control of syphilis.

PUBLIC HEALTH

The role of the private practitioner in controlling syphilis has recently been discussed by Stokes.¹ He believes that local physicians are co-operating well in the control campaign, but also points out that if co-operation fails, the taking over of the problems of syphilis by the state is inevitable. It must provide diagnostic mechanism, drugs and equipment needed for treatment, and must inevitably supply the epidemiologic contact-tracing service (Massachusetts does supply this service). Stokes also believes that the practicing physician should be provided with dependable consultation and should keep medical control of the patients whom he refers. Certainly if the state provides these aids, the medical fraternity should be able to co-operate to the fullest extent in return. A serologic consultation service is already being maintained in some states. Vonderlehr² writes in a similar vein.

Syphilis in industry has received a great deal of attention. Russell³ stresses the economic as well as the social problem. Since there are over 15,000,000 workers in the mining, metal and manu-

facturing trades in the United States, this author points out that a syphilis program covering this group and their families would reach about half the people of the country. Such a program is a colossal task, to say the least. Education may well play the most important role. Elimination of syphilis from industrial workers will not only prolong their lives but make them better producers. A step in this direction was made in the cogent syphilis-control program reported by Wilzbach.⁴ A Cincinnati industrial leader formed a committee of his colleagues to promote the examining of employees for syphilis. Routine blood testing revealed an incidence of 44 cases per 1000 in contrast to only 6 per 1000 discovered when checked on suspicion only. An inexpensive plan was worked out which is paid for by the employer. Only the doctors and the worker know the result. Co-operation by the labor unions was procured. So far no employee in Cincinnati has lost his job on account of a positive serologic report. Educational lectures are preliminary and follow-up features. Many plants adopted a blood test as part of examination at the time of employment, but with the agreement that syphilis was not sufficient grounds for rejection of an applicant. It is obvious that certain qualifications as to the infectiousness and disabling lesions are bound to modify this agreement.

Edwards and Kinsie⁵ have called attention to illegal and unethical practices extant among pharmacists. A survey of 1151 drugstores in 35 cities revealed that only 7 per cent of these refused either to diagnose or to sell so-called "remedies" for venereal diseases. This widespread practice, the many charlatans and various unlicensed practitioners are responsible for a great many improperly treated cases. The authors believe that action

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to offset these factors should include the suppression of illegal drugstore activity, the eradication of quackery in medicine and the education of the public. Numerous other reports bear witness to the existence of state-wide campaigns in the proper direction.

An interesting report on the follow-up of cases of early syphilis from the prearsphenamine era is that of Willners.⁶ Six hundred and sixteen patients seen in Stockholm in 1912 and 1913 with early syphilis received mercury, only, and in later years an occasional injection of other drugs. Three fifths of these patients were living and traced in 1938. An adequate comparison of the effect of therapy was not feasible, but the death rate of the entire group was found to be 32 per cent higher than that among the general population.

The annual report of the Surgeon General of the United States Navy⁷ for 1938 is of interest. Removal of punitive measures imposed on enlisted men contracting venereal diseases revealed an increased incidence of 21.2 per cent. This probably represents the true number of cases. The average patient was sick 2.6 days less, however, and there were fewer complications. Educational work is being increased among enlisted men and may in time reduce the incidence of disease.

IMMUNITY

There are some who maintain that early syphilis should be allowed to go through the secondary stage before treatment is instituted. This theory must be held in abeyance, however, until more is understood about immunity in syphilis. A notable step in the study of immunity is reported by Turner,⁸ who found that syphilitic rabbits develop humoral antibodies to syphilis during the course of their infection. Kemp,⁹ reviewing immunity in syphilis, calls attention to the fact that it is slow in development and does not become evident until the infection has been present for some weeks. Treatment instituted before the immune stage is established may abruptly terminate, or at least delay, its development, and leads to recurrences. Kemp states that late syphilitic lesions are evidence of breakdown in immunity. The difference of immunity maintained by various tissues determines the incidence of later manifestations of syphilis. The Negro race has a high degree of immunity except for the tissues of the cardiovascular system. Women have a stronger immunity than men; Kemp's studies indicated that the female sex hormone may be responsible for this. There are no other definitely known factors which influence immunity in syphilis.

SEROLOGY

There is a continued attempt on the part of the Committee on the Evaluation of Serodiagnostic Tests for Syphilis to improve the quality of procedures performed in the state laboratories. The report of this committee for the years 1938 and 1939¹⁰ indicated that the control serologists are maintaining high standards. Whereas thirty state laboratories were unsatisfactory in 1938, only twenty-two were in this category in 1939. The maintenance of high standards by the control serologists in the state laboratories permits a proper checking and evaluation of the performance of the numerous local laboratories.

The Davies-Hinton test for the examination of cerebrospinal fluid is proving fully satisfactory. Brenner¹¹ reports close agreement of the Davies-Hinton and the Wassermann tests on 2110 consecutive cerebrospinal-fluid examinations. In cases of disagreement the former was found to be slightly more reliable than the latter.

Continued attempts are being made to eliminate the false-positive problem from serologic tests for syphilis. Mohr and Smith¹² studied the supposed daily variations of the reagin content of syphilitic serum, and believe that a fluctuating sensitivity of the tests employed is reflected. They think that the quantitative flocculation technics are valuable in eliminating false-positive reactions in questionable cases. They seriously doubt the value of the provocative test for syphilis. Ingraham and Mayer¹³ investigated the effect of the menstrual cycle on the blood serologic test for syphilis. They concluded that false-positive tests during the menstrual period must be a peculiarity either of the individual patient or of the test employed, and are not due to blood changes present in all women.

Quantitative serologic tests for syphilis are being developed with gratifying results. Greene and his associates¹⁴ report a quantitative study of syphilitic serum with Hinton and Kline tests which gives information indicating reagin titers and eliminates zone reactions. Kahn¹⁵ describes a newly developed serologic verification test, which is a modification of the standard Kahn technic. This should help to detect false-positive tests in questionable cases. This test is intended only as a supplementary procedure to the usual diagnostic tests in doubtful asymptomatic cases.

Another step toward increasing the specificity of serologic tests for syphilis is the development of the spirochete complement-fixation reaction. Eriksenn and Eagle¹⁶ have compared this reaction with the Eagle flocculation and Wassermann procedures. Phenolized cultures of a standard spiro-

chete strain have been found to give positive complement-fixation reactions with syphilitic serums. These authors believe that there is at least a potential superiority in this reaction.

Acute infections have long been thought to be responsible for some temporarily false-positive reports obtained with serologic tests for syphilis. Clifton and Heinz¹⁷ report the finding of 82 children with false-positive or doubtful reactions out of 5620 new patients examined in one year's time at a children's hospital. An acute infection or a severe generalized cutaneous eruption was present in 74 of these patients. These serologic tests returned to normal before or soon after evidences of infection cleared.

Moore¹⁸ has suggested a method of approach to the recognition of the biologic false-positive serologic tests for syphilis. The full text¹⁹ is more than worthy of careful study by anyone faced with this problem. The quantitative serologic test,¹⁴ the Kahn verification test¹⁵ and the complement-fixation test with spirochetal antigen¹⁶ are among the suggested procedures. Although such tests require special laboratory facilities, they may be essential to the solution of some of these cases. It is emphasized that the final decision is a highly individualized problem requiring weeks or months of observation and expert advice. The oft-repeated but pertinent adage that no treatment should be instituted without a definitely established diagnosis still holds.

CLINICAL PROBLEMS

An old and mistaken tenet has been dispelled by Shaw.²⁰ It was often stated that an extensive cutaneous syphilide provided immunity which protected the central nervous system from syphilis. Shaw's report deals with 70 patients exhibiting cutaneous or mucous-membrane syphilides or syphilis of the bones, or both, of which 15 (21 per cent) had neuraxis involvement. All 15 patients had positive cerebrospinal fluids; 7 exhibited symptoms of neurosyphilis. It is obvious that this type of case as well as all others should have routine lumbar punctures. These findings corroborate the experience of most present-day syphilologists.

A review by Dyar and Dalton²¹ describes sixteen different manifestations of syphilis in the eye. According to their statistics syphilis comprises 2 per cent of all eye disease. These various lesions are well described, and the plans of treatment outlined agree with accepted programs of therapy. The importance of syphilis in diseases of the nose and accessory sinuses is emphasized by Smith.²² After describing the recognized syphilitic lesions of these structures, he emphasizes that several non-syphilitic diseases of the nose and sinuses may

have a syphilitic background that retards their response to customary therapy. It is emphasized that surgery of the nose and sinuses in the presence of syphilis may be followed by a prolonged and unsatisfactory healing period, with a high incidence of secondary infection and excessive scar formation. Syphilis of the stomach is reviewed by Williams and Kimmelstiel.²³ Although uncommon, this lesion should not be lost sight of by physicians in dealing with gastrointestinal complaints, and should not be confused with a penetrating ulcer in a syphilitic patient. It should be strongly suspected when a comparatively young person is found, by x-ray examination, to have a smooth, funnel or tube deformity of the stomach accompanied by other stigmas of syphilis. It is difficult to establish the diagnosis definitely, since the response to treatment is very slow.

So-called "latent" syphilis continues to be an engrossing problem. A paper by Cormia and Lewis²⁴ deals with the interpretation of the factor of latency. It is stated that latency is generally assumed to indicate a dormant or inactive process, although this rarely happens. The minimum requirements for the diagnosis of latency include a negative physical examination, normal cerebrospinal fluid and a normal fluoroscopic appearance of the heart and great vessels. The authors state that of all cases in which the diagnosis of latent syphilis is made, 30 per cent will subsequently develop signs of activity. Latency may be clinical, pathologic or serologic; yet these phases are relative, rather than absolute, fixed states. An interesting report by O'Leary and Williams²⁵ deals with the duration of infectiousness of syphilis. It has been a widely used rule of thumb that five years after the acquisition of syphilis the disease is not transmissible regardless of therapy. One thousand one hundred and seventy-five married couples were studied by these authors. At least one of each pair had syphilis, and the conjugal transmission of the disease was interpolated. It was concluded that syphilis may be considered infectious during the first five years of the disease, and that although each year thereafter diminishes the possibility of transmission, the likelihood of conjugal infection does not approach the vanishing point until the tenth year.

CARDIOVASCULAR SYPHILIS

Numerous reports regarding cardiovascular syphilis continue to appear, and they support the previously established concepts of the disease. The great value of adequate routine therapy in preventing cardiovascular syphilis is borne out by statistics. Administration of antisyphilitic treatment after the discovery of syphilitic heart disease should

be carried on carefully within the range of tolerance of the individual patient. Only in the most advanced type of syphilis of the aorta (syphilitic aortic insufficiency and extensive aneurysm formation) is the outlook dim in spite of adequate treatment. The period of life expectancy in these cases, according to Kampmeier and Combs,²⁶ is not appreciably extended by antisyphilitic treatment. Of the other factors influencing the duration of life, cardiac decompensation is the gravest. Manual labor was shown to accelerate the progress of syphilitic aortic disease.

NEUROSYPHILIS

By now it is surely an accepted dictum that every patient afflicted with syphilis should have a cerebrospinal-fluid examination, sooner or later, according to the stage of disease present when the case comes under observation. Headache following lumbar puncture is a deterrent in many cases. The time consumed and the expense of hospitalization increase the reluctance of both patient and physician. Kulchar²⁷ believes that cisternal puncture eliminates these objections. He has done 1246 cisternal punctures on 960 ambulatory patients, 80 per cent of whom had no reactions whatever. The usual postpuncture type of headache and occasional pain and stiffness in the cervical region were essentially the only complications encountered. It should be stated that although Kulchar's figures are optimistic, cisternal puncture is not a procedure for casual use by the inexperienced. The skill of a practiced operator is required, and the fact that a fatality can result by puncturing the medulla or dural vessels should serve as adequate warning.

The so-called "tabetic cord bladder" is discussed by Emmett,²⁸ who promulgates new and very rational concepts. It is pointed out that true incontinence is uncommon, there being merely an overflow from a distended bladder or urgency from urinary infection which has been initiated by urinary retention. In many cases it is difficult to tell whether the atonic bladder or an obstruction of the vesical neck is the primary factor. The author goes so far as to say that many cord bladders are really cases of simple obstruction of the vesical neck in which tabes dorsalis plays little if any part.

CONGENITAL SYPHILIS

A new book on congenital syphilis has been published by Dennie and Pakula,²⁹ covering the subject efficiently and in more detail than has been before attempted.

Last year's progress report³⁰ recommended the full perusal of a paper by Black on the diagnosis

of congenital syphilis. This author has condensed the same material in a more recent publication,³¹ which is again to be commended. This is a very concise contribution which will not be quoted because of its brevity and ready availability—it was distributed to all the members of the Massachusetts Medical Society.

According to some authorities, congenital syphilis has been responsible for much mental deficiency. This has not been the experience of syphilologists as a whole, however, and a recent report by Hays³² is enlightening. A review of statistics covering 22,313 cases of feeble-mindedness revealed syphilis in only 4.83 per cent of institutional cases. This is not a high percentage. The high death rate among congenital syphilitic infants may remove many potential feeble-minded cases. On the other hand, perhaps many of these patients would have been feeble-minded without the presence of syphilis. The United States Public Health Service³³ has published its seventh supplement to *Veneral Disease Information* entitled "Syphilis in Mother and Child." This brochure covers the problem of syphilis in the pregnant woman in a concise but most instructive manner, and includes congenital syphilis handled in the same fashion. This and the previous supplements mentioned in preceding syphilis progress reports are obtainable for an extremely modest sum, and should be most useful as a brief outline for the general practitioner.

The controversy regarding the value of acetarsone versus the usual injection therapy for syphilis in children continues unabated. Pediatricians seem to favor the former and syphilologists the latter. The situation has been summarized in an editorial.³⁴ The consensus seems to indicate that results can be obtained with the oral administration of acetarsone in congenital syphilis. It is pointed out, however, that the uncertainty of proper dosage and of administration is a serious deterrent.

There is a tendency among some writers to hold that all offspring of syphilitic mothers who did not receive adequate therapy for syphilis during pregnancy should be routinely treated for syphilis. This dictum we would distinctly deprecate. Many of these infants, if carefully followed, will be found to be free of the disease. The maxim that treatment for syphilis should not be instituted until the diagnosis is unequivocally established is fully as applicable in congenital disease as in the acquired form.

Roentgenographic evidence in the bones of the newborn holds a justly established place in the diagnosis of congenital syphilis. Christie³⁵ has

shown, however, that administration of bismuth to the pregnant woman may be responsible for possibly misleading shadows in the x-ray plates of the bones of the offspring. He points out that since conditions other than syphilis may bring about roentgenographic changes in the bones, confirmatory evidence of syphilis is the more important. Whitridge³⁶ clarified this problem by the administration of weekly injections of bismuth salicylate in oil in the customary dosage for not more than eight injections during the last trimester of 12 nonsyphilitic pregnant women. Roentgenograms taken within the first week of life showed definite roentgenographic changes near the ends of the long bones in 9 infants, consisting of transverse bands of increased density. Evans³⁷ points out that the presence or absence of osseous lesions, as well as other evidence of syphilis, depends on the length of time of infection of the fetus prior to delivery. Thus a child born free of all manifestations of congenital syphilis might not develop such evidence for several weeks or months after birth. This author emphasizes the possibility of making a false diagnosis of syphilis from improper interpretation of changes occurring in the metaphyseal areas which may be due to several nonsyphilitic conditions. In the second or third month of life these changes may become detectable and can be most confusing.

Ariboflavinosis has been found to cause corneal lesions similar to interstitial keratitis. Kruse et al.³⁸ found that riboflavin hastens response to arsenical therapy in syphilitic interstitial keratitis, and speculated on the possible interrelations.

THERAPY

In the field of treatment for syphilis the past year has been productive of the usual reports on various new drugs, the follow-up of studies on drugs already in use and the results obtained. These statistics are in agreement with previous publications and do not warrant further comment.

Hyperpyrexia is the treatment par excellence for some forms of neurosyphilis, notably dementia paralytica. A great burden would be lifted if more fever therapy could be carried out before such cases reach the degenerative stage. Hyperpyrexia, however, is fraught with too many pitfalls, and the incidence of fatalities, even under ideal hospital care, is still sufficiently high to make it too hazardous a procedure to be regarded lightly.

A long-range comparison of malarial and artificial fever in the treatment of paresis is reported by O'Leary and his associates.³⁹ An evaluation was made of the clinical and serologic results of these two types of fever therapy in 1100 malarial treated cases and 320 patients who received arti-

ficial fever. With either form of therapy the chances of clinical remission were 1:2 in mild cases and 1:4 in intermediate cases. In severe paresis only a 1:100 chance was provided by malaria, whereas artificial fever offered a 1:10 chance. It cannot be overemphasized that the sooner treatment is instituted the better the outcome. The crude death rate within three months of the time treatment was instituted was 13 per cent with malaria and 8 per cent with artificial fever. When complete remissions were attained with either form of therapy, they were maintained in 95 per cent of the cases. Both blood and cerebrospinal-fluid serologic results roughly parallel the clinical results. It was found that malaria combined with chemotherapy provided twice as many remissions. A negative blood serologic test was conclusively shown not to indicate the status of the cerebrospinal fluid.

Brunsting and Love⁴⁰ report a useful finding in the tempering effect of bismuth on therapeutic malaria. It was found that 0.1 gm. of sodium bismuth thioglycollate (Thio-bismol) has a definite controlling influence on the sequence of paroxysms of therapeutic malaria. This finding is of especial practical value in those cases in which there is a prolonged slow prodromal rise in temperature and in which a double tertian strain gives rise to daily paroxysms. Following a single injection of Thio-bismol these cases settle down to the usual cycle, with a paroxysm every other day. The severity of malarial therapy can thus be tempered to the tolerance of the patient, and this modality can be applied to a wider range of cases. Cole and his associates⁴¹ corroborate the findings of the preceding authors. The death rate can be distinctly reduced by employing this procedure. Both reports point out that Thio-bismol is not offered as a substitute for quinine in terminating malaria. Repeated injections of bismuth stopped therapeutic malaria for long periods but did not cure it.

The treatment of neurosyphilis in parallel series of 256 cases by Tryparsamide and 314 cases with sodium succinyl-methylamide-p-arsenate (Neocryl) is reported by Ross.⁴² The standard dose of each drug was 3.0 gm. given intravenously at weekly intervals. Twelve months after the end of treatment the results obtained with Neocryl were in no way inferior to those of Tryparsamide. Seventy-eight cases (30 per cent) of those treated with Tryparsamide exhibited toxic manifestations, whereas only 27 cases (9 per cent) of those treated with Neocryl had toxic reactions. It was chiefly in its relative innocuity to the optic nerve that the advantages of Neocryl became apparent. Over half the unfavorable reactions to Tryparsamide were ocular, and 3 cases of complete blindness developed.

Necroly was accountable for only 1 case of visual damage. If this drug is as effective and at the same time as innocuous as this report indicates, it will indeed be a most beneficial boon. Further study is certainly warranted.

Massive-dose intravenous chemotherapy of syphilis, the so called "five day treatment," has been carried on by its instigators. The Council on Pharmacy and Chemistry of the American Medical Association¹³ commends this work for its great possibilities. The frequency of toxic reactions, some of them grave in type, requires the adoption of a conservative attitude, however. The council believes that this form of syphilis therapy is still in the experimental stage, and should be confined to large university and public health clinics or suitable hospitals organized to carry out this project on a recognized experimental plane. Current editorial comment¹⁴ is in full agreement with this opinion. In last year's report¹⁵ we suggested an observation period of ten or fifteen years before final results can be evaluated. There is no reason to change this criterion. Although massive-dose arsenotherapy may prove to be of major importance, the factors of drugs, duration of treatment and elimination of toxic recurrences remain as obstacles. A more suitable type of drug may yet be found, or more effective combinations of existing drugs may prove more satisfactory. It is certain that if these procedures are properly worked out, the economic implications alone will be of tremendous importance.

TREATMENT REACTIONS

An interesting paper by Epstein¹⁶ reports the cases of 2 industrial workers with previous symptoms of plumbism who suffered recurrences following the administration of bismuth for syphilis. The question was raised as to whether bismuth replaces lead stored in the bones, thereby mobilizing the latter. The implication of this report in regard to industrial syphilis is obvious. A possible clue to the mechanism of this phenomenon is found in the report of Corson and his associates,¹⁷ who found that the administration of ammonium chloride brought about the mobilization of bismuth. An increase in the urinary output of calcium accompanied this excretion. The urinary calcium is apparently drawn from the bones, for the blood calcium was not affected. Since calcium and lead are known to be deposited and eliminated in parallel, it is suggested that possibly calcium and bismuth also act similarly. Should this be so, it would explain the effect of bismuth on latent plumbism, as reported by Epstein. An interesting conjecture comes to mind as to the possible effect of ammonium chloride on bismuth stomatitis.

Early acute arsenical erythema ("erythema of the ninth day") are becoming more widely recognized. Thomas and Cañizares¹⁸ report 2 cases in which a second erythema occurred following the later administration of arsenic. It is recognized that in the majority of cases in which an uncomplicated ninth day erythema occurs, subsequent administration of the arsphenamines is satisfactorily tolerated.

Blood dyscrasias following arsenical injections were studied by Falconer and Epstein,¹⁹ who found that 5 of 6 patients developing thrombopenic purpura from arsphenamines could tolerate Mapharsen. These authors believe that allergy is back of these reactions. They found vitamin C to be useless. Leukocyte and platelet counts of the peripheral blood were depressed more by the arsphenamines than by Mapharsen.

A review by Stephenson and Chambers²⁰ of the toxic effects of arsenical compounds as used in the United States Navy throws interesting light on several drugs. There were forty reactions of various types among 123,176 doses. The relative occurrence was as follows: acetarsone 1/26, neosarsphenamine 1/2240 and Mapharsen 1/6108. There were 3 deaths, all with neosarsphenamine. Arsenical dermatitis in some form occurred in 62.5 per cent of the above reactions. Schoch et al²¹ studied the use of Mapharsen following dermatitis from the arsphenamines. They found that the drug could usually be administered successfully to these patients only if their eruptions had been less severe than a generalized exudative exfoliative dermatitis which required hospitalization.

Liver damage from arsenical compounds received considerable emphasis in the past year. Rankin and Marlow²² studied the extent of liver damage after recovery from postarsphenamine jaundice. They believe that the bulk of the evidence favors the opinion that arsenic has a definitely toxic effect on the liver, but that it more often acts jointly with other factors. Severe arsenical reactions and subsequent alcoholism gave rise to the greatest amount of damage. It is obvious that further arsenical therapy in such cases should be pursued with caution.

The effect of diet in guarding against liver damage from the arsphenamines was studied by Messinger and Hawkins.²³ A high protein diet was found to be the most effective prophylactic measure, a high carbohydrate diet was also beneficial though not so uniformly protective. A high fat diet was found to be deleterious, and some of the animals on this regime developed a progressive liver injury, with intoxication which proved fatal.

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REFERENCES

1. Stokes, J. H. The private physician and the public health control of genitoinfectious disease. *Bull. Genitoinfect. Dis.* 3 (No. 12):1-6, 1940.
2. Vonderlehr, R. A. Clinical measures in the control of syphilis. *New Eng. J. Med.* 222:247-250, 1940.
3. Russell, A. E. Syphilis case finding in industry. *J. A. M. A.* 114:1321-1324, 1940.
4. Wilzbach, C. A. A syphilis control program in industry. *J. Social Hyg.* 26:49-55, 1940.
5. Edwards, M. S. and Kinsie, P. M. Illegal and unethical practices in the diagnosis and treatment of syphilis and gonorrhea. *Ven. Dis. Inform.* 21:1-10, 1940.
6. Willners, G. Re-examination of cases of fresh syphilis treated in 1912-1913. *Acta dermat.-venereol.* 20:463-470, 1939.
7. *Annual Report of the Surgeon General, U. S. Navy.* 200 pp. Washington, D. C.: Government Printing Office, 1938.
8. Turner, T. B. Protective antibodies in the serum of syphilitic rabbits. *J. Exper. Med.* 69:867-890, 1939.
9. Kemp, J. E. Practical considerations of immunity in syphilis. *M. Ann. District of Columbia* 9:37-41, 1940.
10. Hazen, H. H., Parran, T., Mahoney, J. F., Sanford, A. H., Seneac, F. E., Simpson, W. M. and Vonderlehr, R. A. Serodiagnostic tests for syphilis as performed in state laboratories in 1938 and 1939: a report of the Committee on Evaluation of Serodiagnostic Tests for Syphilis. *Ven. Dis. Inform.* 21:171-183, 1940.
11. Brenner, C. Comparison of the Davies-Hinton and the Wassermann reaction of the cerebrospinal fluid. *Arch. Neurol. & Psychiat.* 43:605, 1940.
12. Mohr, C. F. and Smith, C. A. On the supposed daily variation of the reagin content of the syphilitic serum. *Am. J. Syph., Gonorr. & Ven. Dis.* 24:322-329, 1940.
13. Ingraham, N. R., Jr. and Mayer, V. R. The menstrual cycle and the blood serologic test for syphilis. *Am. J. Syph. Gonorr. & Ven. Dis.* 24:23-28, 1940.
14. Greene, R. A., Breazeale, E. G. and Croft, C. C. A quantitative study of syphilitic serum. *J. Lab. & Clin. Med.* 25:972-974, 1940.
15. Kahn, R. L. A serologic verification test in the diagnosis of latent syphilis. *Arch. Dermat. & Syph.* 41:817-830, 1940.
16. Erickson, P. T. and Eagle, H. An evaluation of the spirochete complement fixation reaction in comparison with the Eagle flocculation and Wassermann procedures. *Ven. Dis. Inform.* 21:31-37, 1940.
17. Clifton, W. M. and Heinz, M. O. A survey of prenatal syphilis in a hospital for sick children. *J. A. M. A.* 114:1731-1733, 1940.
18. Moore, J. E. A suggested method of approach to the recognition of the biologic false positive serologic test for syphilis. *Bull. Genitoinfect. Dis.* 3 (No. 13):1, 1940.
19. Moore, J. E., Eagle, H. and Mohr, C. F. Biologic false positive serologic tests for syphilis. III. A suggested method of approach to their clinical study. *J. A. M. A.* 115:1602-1606, 1940.
20. Shaw, C. Neurosyphilis and late syphilis of skin, mucous membranes and bones. *Arch. Dermat. & Syph.* 42:456-460, 1940.
21. Dyar, E. W. and Dalton, J. E. Syphilis of the eye. *J. Indiana M. A.* 33:229-234, 1940.
22. Smith, A. T. The importance of syphilis in the diagnosis and treatment of lesions of the nose and sinuses. *Pennsylvania M. J.* 43:252-255, 1939.
23. Williams, C. and Kimmelstiel, P. Syphilis of the stomach. *J. A. M. A.* 115:578-582, 1940.
24. Cormia, F. E. and Lewis, J. A. Interpretation of the factor of latency in syphilis. *Canad. M. A. J.* 42:154-158, 1940.
25. O'Leary, P. A. and Williams, D. H. An appraisal of the infectiousness of syphilis: a study of conjugal syphilis. *Proc. Staff Meet., Mayo Clin.* 15:1-4, 1940.
26. Kampmeier, R. H. and Combs, S. R. Prognosis in syphilitic aortic insufficiency: evaluation of factors other than antisyphilitic treatment. *Am. J. Syph., Gonorr. & Ven. Dis.* 24:578-589, 1940.
27. Kulchar, G. V. Cisternal puncture: a survey of the reactions following 1246 punctures. *Am. J. Syph., Gonorr. & Ven. Dis.* 24:643-650, 1940.
28. Emmett, J. L. "Tabetic Cord Bladder": newer concepts in diagnosis and treatment. *Proc. Staff Meet., Mayo Clin.* 15:91-96, 1940.
29. Dennie, C. C. and Pakula, S. F. *Congenital Syphilis.* 569 pp. Philadelphia: Lea & Febiger, 1940.
30. Lane, C. G. and Crawford, G. M. Syphilis. *New Eng. J. Med.* 222:224-229, 1940.
31. Black, W. C. Diagnosis of congenital syphilis. *Bull. Genitoinfect. Dis.* 3 (No. 11):1, 1940.
32. Hays, R. R. The role of syphilis in the production of mental deficiency. *Proc. Am. A. Ment. Deficiency* 63 (No. 2):25-33, 1939.
33. Cole, H. N., Jeans, P. C., Moore, J. C., O'Leary, P. A., Parran, T., Stokes, J. H. and Vonderlehr, R. A. *Syphilis in Mother and Child.* Supp. No. 7. *Ven. Dis. Inform.* 20 pp. Washington, D. C., 1940.
34. Editorial: The oral treatment of congenital syphilis. *Am. J. Syph., Gonorr. & Ven. Dis.* 24:117-119, 1940.
35. Christie, A. U. The value of roentgenographic examination in the diagnosis of syphilis in newborn infants. *J. Pediat.* 15:230-237, 1939.
36. Whitridge, J., Jr. Changes in long bones of newborn infants following administration of bismuth during pregnancy. *Am. J. Syph., Gonorr. & Ven. Dis.* 24:223-227, 1940.
37. Evans, W. A., Jr. Syphilis of the bones in infancy: some possible errors in the roentgen diagnosis. *J. A. M. A.* 115:197-200, 1940.
38. Kruse, H. D., Sydenstricker, V. P., Schrell, W. H. and Cleckley, H. M. Ocular manifestations of arboflavivirus. *Pub. Health Rep.* 55:157-169, 1940.
39. O'Leary, P. A., Bruetsch, W. L., Ebaugh, F. G., Simpson, W. M., Solomon, H. C., Warren, S. L., Vonderlehr, R. A., Usilton, L. J. and Sollins, I. V. Malaria and artificial fever in the treatment of paresis. *J. A. M. A.* 115:677-681, 1940.
40. Brunsting, L. A. and Love, W. R. The tempering effect of sodium bismuth thioglycolate (thio-bismol) on therapeutic malaria. *Proc. Staff Meet., Mayo Clin.* 15:285-288, 1940.
41. Cole, H. N., De Oreo, G. A., Driver, J. R., Johnson, H. H. and Schwartz, W. F. Use of bismuth injections to manage course of therapeutic malaria. *J. A. M. A.* 115:422-427, 1940.
42. Ross, A. O. F. Comparison of toxicity of trypanamide and neocryl in treatment of neurosyphilis. *Brit. M. J.* 2:283, 1940.
43. Council on Pharmacy and Chemistry. Preliminary report of the Council: chemotherapy of syphilis by massive dose intravenous drip. *J. A. M. A.* 115:857-859, 1940.
44. Baehr, G., Leifer, W., Chargin, L., Hyman, H. T., Mahoney, J. F., Webster, B., Thomas, E., Sobotka, H., Mann, W., Feldbau, E. and Rice, J. L. Massive arsenotherapy in early syphilis by the continuous intravenous drip method. *Arch. Dermat. & Syph.* 42:239-284, 1940.
44. Editorial. Five-day treatment of syphilis. *New Eng. J. Med.* 223:347, 1940.
44. Editorial. Five day treatment of early syphilis. *J. A. M. A.* 115:863, 1940.
45. Epstein, E. Effect of bismuth therapy on latent plumbism. Preliminary report. *Arch. Dermat. & Syph.* 41:38-41, 1940.
46. Corson, E. F., Decker, H. B. and Williams, T. L. Mobilization of bismuth produced by ammonium chloride. *Arch. Dermat. & Syph.* 42:868-873, 1940.
47. Thomas, E. W. and Cañizares, O. Relapsing early acute arsenical erythema: report of two cases. *Arch. Dermat. & Syph.* 42:30-32, 1940.
48. Falconer, E. H. and Epstein, N. N. Purpura haemorrhagica following neoarsphenamine and bismarsen therapy: further studies on sensitivity to arsphenamine and tolerance to mapharsen. *Arch. Int. Med.* 65:1158-1177, 1940.
49. Falconer, E. H., Epstein, N. N. and Mills, E. S. Purpura haemorrhagica due to arsphenamines: sensitivity in patients as influenced by vitamin C therapy. *Ibid.* 66:319-338, 1940.
49. Epstein, N. N. and Falconer, E. H. Effects of neoarsphenamine and mapharsen on formed elements of blood. *Arch. Dermat. & Syph.* 42:909-918, 1940.
49. Stephenson, C. S. and Chambers, W. M. Toxic effects of arsenical compounds as administered in the United States Navy in 1938 with special reference to arsenical dermatitis. *U. S. Nav. M. Bull.* 37:687-699, 1939.
50. Schoch, A. G., Alexander, L. J. and Long, W. E. Mapharsen in the treatment of forty patients following arsphenamine dermatitis. *Arch. Dermat. & Syph.* 42:919-932, 1940.
51. Rankin, T. J. and Marlow, F. W., Jr. Liver damage after recovery from postarsphenamine jaundice: follow-up study. *Am. J. Syph., Gonorr. & Ven. Dis.* 24:301-321, 1940.
52. Messinger, W. J. and Hawkins, W. B. Arsphenamine liver injury modified by diet: protein and carbohydrate protective, but fat injurious. *Am. J. M. Sc.* 199:216-225, 1940.

CASE RECORDS OF THE
MASSACHUSETTS GENERAL HOSPITALANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINIC-PATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27031*

PRESENTATION OF CASE

A baby girl entered the hospital at the age of eleven hours because of jaundice noted one hour after birth.

The family history revealed that the first child died at one month of age of "indigestion"; the second child was living and well; the third child, a boy, died on the first day of life of "yellow jaundice." There was no history in the parents' families suggestive of blood dyscrasia. The mother was well during pregnancy except for edema during the last three days. The child was born at home, by a normal delivery, with a birth weight of 5 pounds, 8 ounces. There was no difficulty in resuscitation, and no jaundice was noted at birth. The vernix was white, and the placenta apparently normal. A large amount of yellowish amniotic fluid was said to have been present. After one hour, the baby was found to be cold and yellow, and the attending physician advised hospitalization, with a diagnosis of "bile-duct obstruction."

Physical examination revealed a well-developed and well-nourished female infant who was extremely hypotonic, brownish yellow and cyanotic, and who appeared moribund. The skin was dry, the extremities cold, and the respirations very shallow. The vernix behind the ears and between the labia was white. The fontanel was not full or bulging. The scleras and conjunctivas were yellowish brown, but no petechiae were found; nor were petechiae present on the skin or mucous membranes. Examination of the lungs was negative. Examination of the heart showed a diffuse apical impulse, which was felt maximally to the left of the mammary line. The heart was enlarged to percussion, but the sounds were of good quality, with a rapid rate and regular rhythm. A systolic murmur was present, heard best at the apex and terminated by a sharp second sound. The abdomen was moderately enlarged, with hypotonic musculature. Both liver and spleen were greatly enlarged, with the lower margins palpable

at the iliac crest laterally; the spleen was approximately 5 cm. wide and of rather firm consistence. The extremities were hypotonic almost to the point of flaccidity, but there was no edema.

The temperature was normal, the pulse 142, and the respirations 16.

Examination of the urine showed it to be brown with a ++ test for albumin and a ++ test for bile. Microscopically there were occasional white cells and many epithelial cells. Examination of the blood showed a red-cell count of 2,300,000 with a hemoglobin of 68 per cent, and a white-cell count of 320,000 nucleated cells, of which approximately 303,000 were of the erythrocytic series. A blood film showed marked macrocytosis, hypochromia and polychromatophilia, and large numbers of all types of the red-cell series from extremely primitive bone-marrow cells down to erythrocytes. The clotting time of the blood was 2 minutes, and the bleeding time longer than 15 minutes.

Fluoroscopy revealed marked cardiac enlargement, with feeble heart action.

The patient received a transfusion of 60 cc. of citrated whole blood, and her color improved. Approximately eight hours after admission, a second transfusion of 30 cc. of whole blood and 30 cc. of 10 per cent glucose were given. The patient was maintained in an oxygen tent throughout. The following morning her condition remained poor; the skin was yellow, and the respiratory rate 16 to 18 per minute. She refused to suck and responded poorly to stimulants. The red-cell count was 3,400,000 with a hemoglobin of 75 per cent, and the white-cell count 280,000 nucleated cells, of which 266,000 were of the erythroblastic series. Digifolin, 1.5 gr., was given intramuscularly without significant effect, the apical beat falling from 142 to 136. The child could not be roused by stimulation, the temperature began to fall, edema of the skin and subcutaneous tissues was noted and the lungs became increasingly congested with many moist rales. A lumbar puncture yielded 3 cc. of xanthochromic fluid, which contained 12 red cells and 3 nucleated cells per cubic millimeter; the Pandy reaction was faintly positive, the serum van den Bergh indirect, the sugar content normal, and the total protein 110 mg. per 100 cc., with no growth on culture. The respirations and heart rate gradually slowed, and Coramine was given with no effect. For the last half hour of life the heart beat very slowly and irregularly and the respirations were gasping, occurring in series of two or three in Cheyne-Stokes fashion. The child died twenty hours after admission. Terminally the carbon dioxide combining power of the blood was 47.6 vol. per cent, the nonprotein nitrogen 66 mg.

*This case is presented through the courtesy of the Children's Hospital, Boston.

per 100 cc., the serum protein 4.8 gm., and the serum sugar 95 mg.

DIFFERENTIAL DIAGNOSIS

DR. LEO B. BURGIN: We have a newborn infant who entered the hospital in a moribund condition with a history of jaundice starting immediately after birth, with enlarged heart, liver and spleen, and a blood picture showing anemia and unusual erythroblastic activity. This case presents a new experience in these exercises, a family history that is relevant. There are a number of disorders and syndromes in the neonatal period that might account for some of the findings.

Infection with sepsis, whether acquired or antenatal, can give such a picture in the newborn. Signs of infection precede as a rule the signs of a disturbed hematopoietic system. Since there is no evidence of fever, vomiting or diarrhea, and no evidence of an acquired disease process, we can dismiss this cause.

Congenital malformation of the bile duct must be considered. It would give rise to the severe degree of jaundice that was observed in this case. However, the jaundice at birth is usually slight, but with the passage of time becomes severer. We should not expect to find this degree of erythroblastic activity during the neonatal period. We might expect 1000 or 2000 nucleated red cells per cubic millimeter, but not 200,000 or 300,000. In addition, congenital malformation of the bile ducts would hardly explain the presence of an enlarged heart.

From the laboratory data we have no evidence of blood dyscrasia—leukemia, aplastic anemia or familial hemolytic jaundice. The family history of jaundice is suggestive, but although hemolytic jaundice is described in the neonatal period, it is not common, and it would be unusual to find two neonatal cases in one family. In addition, there is no marked erythroblastic activity with hemolytic jaundice.

We might suppose a combination of two things, although we should like to explain everything by one diagnosis. The infant might have had congenital malformation of the heart, with icterus neonatorum. Jaundice in the newborn usually occurs after two or three days, is usually not so intense, and is not associated with marked enlargement of the liver and spleen; moreover, it is not associated with such large numbers of young red cells in the peripheral blood.

I think there are two conditions that could explain all the findings—congenital syphilis and erythroblastosis fetalis. In some cases syphilis can give rise to the symptoms noted here: enlarged

liver and spleen, large numbers of young red cells in the peripheral blood and enlargement of the heart. In this case, the presence of a white vernix caseosa and normal placenta is somewhat in favor of such a diagnosis. The family history is suggestive but not typical of what one expects in a family with syphilis. I have not forgotten that five or six years ago I admitted a child with a diagnosis of erythroblastosis of the newborn in whom Dr. Mallory demonstrated treponemas in the liver and other organs. The clinical picture seemed typical of erythroblastosis fetalis. However, in congenital syphilis, I do not believe that the erythroblastic picture starts so early as this—on the eighth or ninth day perhaps, but hardly at the beginning.

My diagnosis is erythroblastosis fetalis. The blood picture is typical—anemia, a color index greater than one, macrocytes in the peripheral blood, a large number of nucleated red cells and a prolonged bleeding time. The family history is distinctly in favor of such a diagnosis, as is the severe degree of icterus. The enlarged heart is a common finding in erythroblastosis fetalis. The absence of a golden vernix and enlarged placenta is a slightly discordant note, but we know that erythroblastosis fetalis can occur in a number of forms.

When edema is a prominent symptom we have “universal edema of the newborn”; when icterus is the prominent feature we have “icterus gravis neonatorum”; when anemia is marked, “congenital anemia of the newborn.” All degrees of the disorder may occur, so that we may expect that some cases will not have a golden vernix caseosa. The amniotic fluid is described as “yellow.” I shall keep my diagnosis of erythroblastosis fetalis.

As to the cause of death, I think it was cerebral in origin. The patient had Cheyne-Stokes respiration, the heart continued to beat for a half hour, and the respirations were rather diminished. Whether the cerebral signs were due to hemorrhage or to the presence of icterus, it is difficult to say. A spinal tap showed xanthochromic fluid, which suggests hemorrhage. On the other hand, the color might have been due to the presence of large quantities of bile in the spinal fluid. There were not a great many cells. If hemorrhage occurred in the first twenty hours, I think one ought to expect the presence of many more red cells than are reported in this case. The presence of an indirect serum van den Bergh suggests hemorrhage. There was no growth on culture, and no evidence of infection in the central nervous system. We know that, in erythroblastosis fetalis, icterus can involve the nuclei of the brain and give rise to cerebral symptoms. That, rather than

actual hemorrhage, probably was the cause of death; although hemorrhage can occur in erythroblastosis fetalis, it is usually petechial in type. We have here a prolonged bleeding time, and I see no reason why there should not have been hemorrhage into the brain.

The occurrence of edema terminally might have been due to failure of the heart. On the other hand, it might have been a part of the picture of erythroblastosis fetalis, with the anemia and poor oxygen carrying power of the nucleated red cells resulting in damage to the capillaries, in loss of fluid into the tissues and in consequent edema. The blood chemical findings were probably due to the fact that the child was dying, but here again we might explain the increased nonprotein nitrogen as due to impairment of the kidney function because of large areas of extramedullary hematopoiesis that occur in this disease. The liver, kidney and other organs show large areas of blood formation, and these may interfere with normal function. My diagnosis is erythroblastosis fetalis.

DR. ELI ROMBERG: Do you think there is a possibility of congenital heart disease superimposed on this picture, such as an open foramen ovale?

DR. BURGIN: That is possible. Murmurs in newborn infants are not reliable. Systolic murmurs have been described in a great number of cases with this condition, and I should like to explain the whole thing on one diagnosis.

CLINICAL DIAGNOSIS

Erythroblastosis fetalis.

DR. BURGIN'S DIAGNOSES

Erythroblastosis fetalis.

Kernicterus.

ANATOMICAL DIAGNOSES

Erythroblastosis fetalis.

Kernicterus.

Edema and congestion, generalized

PATHOLOGICAL DISCUSSION

DR. SIDNEY FARBER*: Dr. Burgin has described our findings accurately. The patient did have erythroblastosis fetalis. There was also kernicterus or jaundice of the nuclear masses of the brain. The liver was enlarged two and a half times, the spleen eight times. Moderate enlargement of the liver and more marked enlargement of the spleen are characteristic of erythroblastosis fetalis. In congenital syphilis the liver and spleen are much firmer and much more distorted in archi-

tecture than they were in this case. The enlargement of the liver and of the spleen in erythroblastosis may be explained in great part by the presence of large numbers of immature cells of both the red cell and the white cell series. Similar collections of cells were found in this case in the interstitial tissues of the kidneys, pancreas, lungs, heart and many other organs and structures in the body—a finding characteristic of erythroblastosis. In this disease hematopoietic activity is present to a degree greater than that observed in the normal newborn infant, and in many more locations in the body.

Yellow pigmentation, an indication of kernicterus, was present in the basal ganglia and in a number of other cerebral nuclei all the way down the cord. The pigmentation may vary greatly in intensity. Its exact nature is not clearly proved; it is possible that we are dealing with a number of different pigments in this condition. We were under the impression, until a year ago, that kernicterus was characteristic of erythroblastosis fetalis and that impression may be gained from the literature. Dr. Tague Chisholm and I are studying a group of 26 patients with kernicterus. Only 3 of these patients gave evidence of erythroblastosis. Many of them were premature infants. The correct interpretation of the nature of kernicterus must await further study. It is safe to say that the icterus part of the name has been grossly over-emphasized and may not be important.

DR. J. H. MEANS: Is this a form of Cooley's anemia, or is it a quite distinct disease?

DR. FARBER: Erythroblastosis fetalis is quite a distinct disease. Cooley's anemia occurs almost universally in patients of Mediterranean heredity. It may be observed in early life, but it is rare to find it in marked form in the neonatal period. Erythroblastosis fetalis has been found in patients of almost every race and nationality.

DR. TRACY B. MALLORY: There is very great confusion between the two diseases because of the somewhat similar names that have been given to them. A long, very detailed paper by Micklin† about the hereditary aspects of these diseases unfortunately confuses the two. Cooley's or erythroblastic anemia is quite obviously a recessive type of disease, whereas erythroblastosis fetalis occurs, I believe, as a dominant mutation.

DR. GEORGE W. HOLMES: Is there any treatment for it?

DR. HAROLD L. HIGGINS: Transfusion is the treatment of choice, and often causes a dramatic cure.

DR. MALLORY: In a significant number of the

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†Micklin N. T. Erythroblastosis foetalis. *Am J Dis Child* 53:1245 1267 1937

mild cases the patients are being kept alive now, and they raise a very definite problem for future generations. If Macklin is correct, once the mutation has occurred, it is inherited as a dominant characteristic, so that we must expect in the future many more cases of this disease.

DR. JOHN D. STEWART: What neurological symptoms do you expect from kernicterus?

DR. FARBER: Most of the symptoms are dependent on changes in the basal ganglions.

DR. STEWART: It may be the cause of death, in other words?

DR. FARBER: Patients with kernicterus often suffer from some other unrelated disease, such as pneumonia.

DR. STEWART: What cerebrospinal-fluid changes are characteristic?

DR. FARBER: I should say that the spinal fluid shows nothing remarkable.

CASE 27032

PRESENTATION OF CASE

First Admission. An eighteen-year-old girl entered the hospital with the complaint of abdominal pain and diarrhea.

Eight months before entry she began to have painless diarrhea one to three times daily. The onset of the diarrhea was insidious and unrelated to any change in habits or diet. Previously she had had one bowel movement a day. Her stools were watery or mushy, rarely formed. They contained no blood or pus to her knowledge, and at that time she had no other symptoms. Her physician put her on absolute bed rest for one week and restricted her activities for three more weeks, but this treatment had no effect on the symptoms. The diarrhea continued practically unchanged until one month before entry, when for the first time the patient began to have attacks of cramplike low abdominal pain. The pain usually came on during or immediately after supper, was moderately severe, and lasted two to five minutes. It was localized just below and to the right of the umbilicus, and was sometimes accompanied by a dull ache in the lumbar region posteriorly. The pain did not interfere with her activity and never woke her from sleep. Previous to entry the patient lost about 20 pounds in weight. She never had any nausea, vomiting, hematemesis, melena, jaundice, fever or genitourinary or cardiorespiratory symptoms. The diarrhea continued unchanged up to the time of entry. The past history and family history were noncontributory. For three months her physician had been giving her iron, and for one month liver capsules.

Physical examination revealed a well-developed and well-nourished girl lying quietly in bed in no discomfort. The examination was entirely negative except for an area of deep tenderness without spasm in the right lower quadrant of the abdomen. There seemed to be some increased resistance in that area, but no masses could be made out. Pelvic and rectal examinations were negative. The blood pressure was 104 systolic, 86 diastolic.

The temperature was 98°F., the pulse 100, and the respirations 20.

Examination of the urine was negative. The blood showed a red-cell count of 3,940,000 with 65 per cent hemoglobin, and a white-cell count of 5000 with 70 per cent polymorphonuclears, 26 per cent lymphocytes, 2 per cent eosinophils and 2 per cent basophils. The stools were repeatedly guaiac negative. A Frei test and a 1:1000 tuberculin test were negative. The stomach contents contained 91 units of free acid and 32 units of combined acid after the administration of histamine and alcohol.

X-ray examination of the chest was negative. A barium enema showed no evidence of disease in the colon or cecum. A gastrointestinal x-ray series showed marked narrowing and irregularity of the terminal ileum. The mucosal folds were irregular and partially destroyed, and segments of the bowel showed multiple small irregular filling defects. The involved portion of the bowel was rigid and distinctly palpable. There was no obstruction to the flow of barium, the motor meal having reached the hepatic flexure in six hours. There was some gas in the upper ileum and jejunum, but no evidence of dilatation.

During her stay in the hospital the patient never had more than one stool a day, although they were all mushy. She also had no attacks of pain. Proctoscopy done on the seventh day was negative. She was discharged on the eighteenth day.

Second Admission (fourteen months later). The patient was discharged on a regime of rest with limited activities, a high-vitamin, high-calorie, low-residue diet, and yeast, cod liver oil and ferrous sulfate medication. For several weeks after discharge she had two or three loose bowel movements a day without other symptoms, but after that time she began to have one normal bowel movement daily and was essentially symptom free until three and a half months before re-entry. Occasionally she had a loose bowel movement, but not with any regularity. A gastrointestinal x-ray series six months after discharge showed little or no change from the previous examination. During the six months the patient gained 13 pounds in weight. About three and a half months before

the second admission, however, she again began to lose weight and to have some general malaise. She also had attacks of dull aching pain, which came on just before eating, occurred two or three times a day, were not increased by eating, were localized to the right of the umbilicus, and lasted about fifteen minutes. On occasions the pain would awaken her at night. She had some anorexia and nausea, and often vomited small amounts after meals. Her physician thought that the iron medication was causing the symptoms; following its removal the nausea and vomiting ceased, but the pain continued. The patient also continued to have occasional loose bowel movements. She thought that her general health had been gradually failing. She became more easily fatigued, lacked energy, and lost a total of 20 pounds in weight during the three months before re-entry. She always followed her diet, but for the three months prior to the second admission took no iron, and for the month before re-entry no yeast or cod-liver oil.

Physical examination revealed a well-developed, well-nourished girl who was somewhat pale but not acutely ill. In the right lower quadrant a tubular mass, which was slightly tender on deep pressure, could be palpated. The examination was otherwise negative. The blood pressure was 112 systolic, 60 diastolic.

The temperature was 99°F., the pulse 105, and the respirations 20.

Examination of the urine was negative. The blood showed a red-cell count of 4,000,000 with 70 per cent hemoglobin, and a white-cell count of 8500 with 78 per cent polymorphonuclears. The stools were soft and repeatedly guaiac negative. The corrected sedimentation rate was 0.8 mm. per minute.

A gastrointestinal x-ray series showed a grossly constricted, irregular loop of lower ileum, in which the mucosal pattern was completely destroyed. There was also dilatation of the upper ileum.

An operation was performed on the fifteenth day.

DIFFERENTIAL DIAGNOSIS

DR. JOHN D. STEWART: We are given a diagnostic problem the central feature of which is a protracted, mild, bloodless diarrhea, during the course of which abdominal pain and impairment of the general health and nutrition appeared. It is further to be noted that fever was absent, and that a tender tubular mass was later apparent in the right lower quadrant, where the abdominal pain had been most noticeable. On the basis of the symptomatology one thinks first of affections

of the colon, which produce chronic diarrhea. Chronic ulcerative colitis, a disease of unknown etiology subject to exacerbations and remissions, is a not uncommon cause of diarrhea and gradual deterioration in health. There may be crampy, unlocalized abdominal pain as the diarrhea becomes severe, and gross or occult bleeding is the rule. This diagnosis has been excluded in the present case, however, by the absence of blood in the stools, the negative barium-enema study, and the normal findings on proctoscopic examination. Chronic ulcerative colitis results in destruction of the colonic mucosa, with narrowing of the lumen, rigidity of the wall and loss of haustration. Since the ulcerations commonly appear first in the distal colon, the proctoscopic examination often gives conclusive diagnostic evidence. Tuberculosis of the colon may produce chronic diarrhea of variable severity, as may amebic ulceration of the colon, and into the differential diagnosis also comes lymphopathia venereum, which occasionally results in ulceration and stricture of the rectum or colon. However, disease of the colon has been conclusively excluded in this case by the negative barium enema and proctoscopic examination, and the negative tuberculin test and Frei test are in conformity with this conclusion. Polyposis and carcinoma of the colon may also be regarded as eliminated from the diagnostic possibilities, and the course of the disease seems to be too long and the diarrhea too mild for bacillary dysentery.

It does not come as a surprise to be told that the gastrointestinal x-ray series showed narrowing and irregularity of the terminal ileum, with partial destruction and ulceration of the mucosal folds. Ulcerations of the terminal ileum may produce cramplike central abdominal pain, nausea and vomiting and mild diarrhea. The dull ache in the lumbar region could be due to inflammatory infiltration of the mesentery of the small intestine or to involvement of the posterior parietes.

The question arises whether the ulcerations in the terminal ileum are due to neoplasm, such as lymphoblastoma, cancer or carcinoid, to tuberculosis or to so-called "regional enteritis," the cause of which is as yet unknown. The differentiation of ileal ulceration due to neoplasm from that due to chronic inflammation rests chiefly on the x-ray findings, although the protracted course of the process and the paucity of symptoms of obstruction of the lumen tend to exclude neoplasm. The three gastrointestinal x-ray studies made over a period of fourteen months showed an advancing ulcerating process in a loop of terminal ileum, with destruction of mucosa, narrowing of the lumen and loss of motility. Later, dilatation of the small intestine proximally was

spection of the films made at the third x-ray study of the small intestine shows the so-called "string sign," which consists of a thin stream of unevacuated, opaque medium in a narrowed rigid-walled lumen. I believe that these findings could all be due to tuberculosis, but regional enteritis is the likelier diagnosis. The negative tuberculin test, though of course not conclusive, is evidence against tuberculous enteritis.

The patient was given a careful trial of non-surgical treatment, including rest and high-carbohydrate, high-vitamin low-residue diet. A period of temporary improvement followed, but unfortunately this was not maintained, which not infrequently occurs in the management of this disease. Surgical treatment then became necessary, and probably consisted either of resection of the diseased ileum and mesentery or of a sidetracking ileocolostomy.

The most probable diagnosis seems to be regional ileitis, with secondary malnutrition and partial obstruction of the small intestine.

CLINICAL DIAGNOSIS

Regional ileitis.

DR. STEWART'S DIAGNOSIS

Regional ileitis, with secondary malnutrition and partial obstruction of the small intestine.

ANATOMICAL DIAGNOSIS

Idiopathic regional ileitis.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: As Dr. Stewart has pointed out, the diagnosis, once all the data were in, could hardly have been anything but idiopathic regional ileitis. The important point in the diagnostic work-up of such a patient is to be sure that the roentgenologist's attention is called to the possibility of a small-bowel lesion so that he may make suitable adaptations in technic.

The patient was operated on by Dr. Leland S. McKittrick not simply because she had regional ileitis but because he believed it had resulted in intestinal obstruction of sufficient degree to demand surgical intervention. At operation he found that the ileum, beginning at a point 5 cm. from the ileocecal valve and extending upward for a distance of 20 cm., was thickened and contracted. Its serosa seemed velvety, and the mesentery was considerably thickened. Numerous enlarged lymph nodes, ranging up to 1.5 cm. in diameter, were present in

the corresponding segment of the mesentery. For technical reasons the cecum, as well as the terminal 40 cm. of ileum with the corresponding mesenteries, was resected, and a lateral anastomosis to the ascending colon was performed.

When the specimen was examined in the laboratory the process was found to be even more extensive than had been thought at operation. It extended from the ileocecal valve, which was markedly stenotic, upward for a distance of 40 cm., leaving only 5 cm. of uninvolved bowel at the upper margin of the resection. There were also several small ulcers in the cecum. In the ileum the ulcers were characteristically located over the mesenteric attachment, though the mucosa was inflamed throughout. All layers of the wall were thickened by inflammatory infiltration and scar tissue. A very characteristic feature, also exemplified here, is the thickening and induration of the fat pad at the point of mesenteric attachment. The lymph nodes in the mesentery are usually enlarged, and in this case they were big, wet and soft. Microscopically these cases usually show a nonspecific inflammatory reaction in the mucosa, with polymorphonuclear leukocytes, lymphocytes and large numbers of plasma cells. Usually, but not always, focal collections of epithelioid cells and giant cells in tuberculoid arrangement are present. Caseation is never found, and no tubercle bacilli can ever be demonstrated. The reaction is very similar to that seen in sarcoid. In this patient the lymph nodes were full of such areas, and the resemblance to sarcoid was particularly striking. So far as I know, however, no case of regional ileitis has ever been reported showing any of the well-recognized forms of sarcoid, such as skin lesions, dactylitis, hilar-node involvement, miliary lesions in the lung or uveoparotid fever.

The subsequent course of this patient has also been very typical. Following operation she had no further attacks of pain. The tendency to diarrhea continued, however. At a routine check-up six months later, x-ray examination showed recurrence of the disease in the terminal 15 cm. of the ileum adjacent to the anastomosis. A year later the area of involvement had doubled in length. Subsequent treatment has been medical, with a low-residue, high-vitamin diet, iron and liver, and the patient has been kept fairly comfortable, except for complicating hemorrhoids, though her course has been slowly downhill. No one has shown any enthusiasm for further surgical intervention.

The New England Journal of Medicine

Formerly the

Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of

THE MASSACHUSETTS MEDICAL SOCIETY
THE NEW HAMPSHIRE MEDICAL SOCIETY

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SUBSCRIPTION TERMS \$6.00 per year in advance, postage paid, for the
United States, Canada, \$7.04 per year, \$8.52 per year for all foreign coun-
tries belonging to the Postal Union

MATERIAL for early publication should be received not later than noon
on Saturday

THE JOURNAL does not hold itself responsible for statements made by any
contributor.

COMMUNICATIONS should be addressed to the *New England Journal of
Medicine*, 8 Fenway, Boston, Massachusetts.

MEDICAL SERVICE CORPORATIONS

ELSEWHERE in this issue of the *Journal* is a copy of the petition and proposed enabling act recently submitted by the Massachusetts Medical Society to the General Court of the Commonwealth of Massachusetts. The Society seeks legislation to permit the formation of a corporation or corporations, nonprofit in character, that will offer a means of meeting the costs of medical care.

In drafting this bill the special committee followed the outline submitted to and approved by the Council in October, 1940, incorporating various suggestions made by the Council at that time. The final form was approved by the Committee on Public Relations.

The guiding principles were as follows: that

subscription be on a voluntary basis; that participation be open to all physicians licensed to practice in Massachusetts; that the Massachusetts Medical Society exercise indirect supervisory control of the corporation or corporations through its approval of the appointment of the majority of the directors; and that the corporation or corporations be under the control of the commissioner of insurance.

That any such plan should be on a voluntary, rather than compulsory, basis is agreed by all.

Whether all licensed physicians should be allowed to participate in the dispensing of medical care has been controversial. In fact a supplementary bill has been filed that is quite similar to that of the Society, the chief exception being a provision for the possible limitation of participating physicians to certain minimum requirements over and above licensure. Although it is acknowledged that every effort should be made to improve the standards of medical care, to try to accomplish this by legislation seems both improper and unwise. The special committee is strongly of the opinion that any state-wide, medical-costs insurance plan sponsored by the Society should include the right of all licensed physicians to participate.

Any such corporation concerned with medical care should obviously be under the direct or indirect control of those who are supplying medical service, namely, the physicians. Hence the provision that a majority of the directors be approved by a well-established and sizable medical society is logical.

It seems wise that such a plan be under the supervisory control of the commissioner of insurance, especially in view of the experience of other states, notably New Jersey. By so doing the corporation better protects itself and its subscribers.

The bill specifically states that it in no way interferes with the activity of any insurance company, any fraternal benefit society or any corporation organized under Chapter 180 of the General Laws. This section clearly refutes any charge that the Society is endeavoring to create a monopoly of such plans.

The bill is submitted as evidence of a sincere effort on the part of the Massachusetts Medical Society to meet the present-day problems of low-income groups in regard to paying for medical care. All members of the Society should become thoroughly familiar with the general principles of the bill, and should explain its purpose to laymen at every opportunity.

GRADUATE EDUCATION FOR INTERNS

IN recent years the internship has been discussed from several points of view, but although the realization has grown that it presents an exceptional educational opportunity, there has been far too little transmission of this thought into action in accordance with a carefully planned procedure. Only recently has the educational value of the internship been estimated so highly that it is regarded as requiring considerable planning as to content and schedule. There is as yet no general agreement about what the intern should accomplish or about the functions that he may reasonably be expected to perform. In some medical schools, a year's internship is required before the degree is conferred; and in some states one year of internship in an approved hospital is a condition for admission to examination as a qualified practitioner. In many states and in most medical schools, however, the internship receives no formal recognition, although it may well include one of the critical periods in the life of the physician. At present nearly every physician who is free to choose spends at least one year in a hospital before he begins the independent practice of medicine.

In the process of transition from the old type of internship with almost no supervision to the ultramodern internship with almost a complete laying out of time for practical work and study, it is extremely interesting to consider the various ways in which this relatively new problem is being approached. It is for this reason, as well as for its intrinsic merit, that the paper by Dr. Nathan Smith, which appears in this issue of the *Journal*,

deserves careful review by the staff members of all hospitals that have interns.

Dr. Smith's plan is to provide an internship that will be a good useful introduction to the general practice in which most physicians will engage. But he considers it also the best foundation for specialism. In this respect his plan differs radically from the procedure adopted by a number of other hospitals, of which the Massachusetts General Hospital is one. On June 1, 1940, a brochure entitled "Graduate Training in Surgery" appeared in which the system recently adopted for surgical interns and residents in that institution is described. In the period devoted to the graduate training in surgery,—about five years and eight months,—opportunity will be given for work in "any laboratory in this country or abroad" under certain conditions, the subject of the study not being stated, and for a "short clinical internship" in "obstetrics or any other clinical field." Thus little time is devoted to fields outside surgery. Another interesting feature of this procedure is that it seems not to pyramid; that is, if the candidate survives the internship, he is in direct line for the residency. This system has problems of its own, but it avoids the rejection of worthy but incompletely trained candidates before the residency is reached simply because there are too many of them for the available positions.

The plan described by Dr. Smith presents another noteworthy feature. The intern is also taught ordinary nursing procedures, so that he may be able to write intelligent nursing prescriptions. This is a significant and much needed reminder that under contemporary conditions the care of the sick requires the co-operation of the medical and the nursing professions.

Each hospital that trains interns and thereby gives them graduate medical education should work out for itself the system best suited to its circumstances, but it should be informed of what others are doing and have accomplished; the experiences of the Morrisania City and Massachusetts General hospitals may well be studied with interest and profit by all.

MEDICAL EPONYM

FRIEDREICH'S ATAXIA

"Ueber degenerative Atrophie der spinalen Hinterstränge [Degenerative Atrophy of the Posterior Spinal Columns]" was described by Professor Nikolaus Friedreich (1825-1882), of Heidelberg, in *Virchow's Archiv für pathologische Anatomie und Physiologie und für klinische Medizin* (26:391-419, 433-459, 1863). He concludes a series of detailed case reports with observations on this condition. A portion of the translation follows:

There is a chronic inflammatory degeneration of the spinal cord that leads to atrophy, and that seems to develop especially in puberty as the result of some hereditary tendency. This is essentially confined to the posterior column, begins in the lumbar portion of the cord, progressing both upward and downward and limited by the elongation of the cord only after involving the origin and roots of the hypoglossal nerves. The affection is characterized clinically by a very gradually developing disturbance of association and harmony of movements, which progresses upward from the lower half of the body, always finally involving the organs of speech. There is complete integrity of the organs of sensation and cerebral function.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

STATED MEETING OF THE COUNCIL

A STATED meeting of the Council will be held in John Ware Hall, Boston Medical Library, 8 Fenway, on Wednesday, February 5, 1941, at 10:30 a.m.

Business:

1. Call to order at 10:30 a.m.
2. Presentation of record of meeting held October 2, 1940, as published in the *New England Journal of Medicine*, for October 31, 1940.
3. Report of Auditing Committee and of Treasurer.
4. Reports of standing and special committees.
5. Appointment of Delegates.
 - (a) To the House of Delegates, American Medical Association, for two years from June 1, 1941.
 - (b) To the annual meetings of the five New England state medical societies in 1941.
 - (c) To the Annual Congress of the American Medical Association on Medical Education and Licensure at the Palmer House, Chicago, February 17 and 18, 1941.
6. Incidental business.

ROBERT N. NYE, *Secretary pro tempore*.

Councillors are asked to sign one of the two attendance books before the meeting. The Cotting Luncheon will be served immediately after the meeting.

COMMITTEE TO STUDY
MEDICAL-COSTS INSURANCE PLANS

A petition for the passage of legislation to permit the formation of a corporation, nonprofit in character, that seeks to pay the medical-care costs of patients was submitted by the Massachusetts Medical Society to the General Court on January 11, 1941. A copy of the proposed act, approved by the Committee on Public Relations follows.

THOMAS H. LANMAN, *Chairman*.

* * *

AN ACT PROVIDING FOR THE FORMATION
OF MEDICAL SERVICE CORPORATIONS

WHEREAS, The deferred operation of this act would tend to defeat its purpose, therefore it is hereby declared to be an emergency law, necessary for the immediate preservation of the public convenience, be it

ENACTED by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:

The General Laws are hereby amended by inserting after chapter one hundred and seventy-six A, as appearing in the Tercentenary Edition, as amended, the following new chapter:

CHAPTER 176B

MEDICAL SERVICE CORPORATIONS

Section 1. In this chapter the following words shall have the following meanings:

"Commissioner," the commissioner of insurance.

"Covered Dependent," a dependent for whose medical care provision is made in a subscription certificate issued by a medical service corporation to a subscriber.

"Dependent," the spouse, child or foster child of a subscriber, or an adult relative dependent upon the subscriber for his or her support.

"Medical Service," the general and special medical services ordinarily provided by registered physicians in accordance with accepted practices in the community where the services are rendered.

"Medical Service Corporation," a corporation organized under the provisions of this chapter for the purpose of establishing and operating a non-profit medical service plan.

"Non-profit Medical Service Plan," a plan operated by a medical service corporation under the provisions of this chapter, whereby the cost of medical service furnished to subscribers and covered dependents is paid by the corporation to participating physicians and to such other physicians as are provided for herein.

"Participating Physician," a registered physician who agrees in writing with a medical service corporation to perform general or special medical service for subscribers and covered dependents at such rates of compensation as shall be determined by its board of directors and to abide by the by-laws, rules and regulations of such corporation.

"Registered Physician," a physician registered to practice medicine in the commonwealth of Massachusetts as provided in section two of chapter one hundred and twelve.

"Subscriber," a person who has subscribed to a non-profit medical service plan and to whom a subscription

certificate has been issued in accordance with the provisions of section six.

Section 2. For the purpose of establishing, maintaining and operating a non-profit medical service plan, any seven or more persons may form a medical service corporation. Such a corporation shall be formed in the manner prescribed in and subject to section nine of chapter one hundred and fifty-five and sections six and eight to twelve inclusive of chapter one hundred and fifty-six, except as follows:

The agreement of association of a corporation having no capital stock may omit the statement of the amount of the capital stock and the par value and number of its shares. The fee to be paid to the state secretary upon the filing of the certificate of condition shall be ten dollars.

Every certificate of organization and every amendment to the articles of organization or by-laws of such a corporation shall have endorsed thereon or attached thereto the consent of the commissioner.

Section 3. The by-laws of a medical service corporation may contain any lawful provisions approved by the commissioner and shall provide that a majority of the directors shall at all times be persons approved in writing by a medical society incorporated in Massachusetts not less than ten years and having not less than two thousand registered physicians as members. The by-laws of such a corporation may define the qualifications of those persons eligible to become subscribers as provided in section five. Any such corporation may adopt such rules and regulations as may be consistent with the provisions of this chapter.

Section 4. Any medical service corporation may enter into contracts with its subscribers and with participating physicians for the rendering of medical service to the subscribers. A contract with a subscriber may provide for the medical care of any dependents of the subscriber named therein. The form of subscription certificate and of agreement with participating physicians, the rates charged by such corporation to the subscribers and the rates at which participating physicians are compensated for their services to the subscribers or to covered dependents, and the acquisition costs in connection with the solicitation of subscribers shall at all times be subject to the written approval of the commissioner.

Section 5. Any person residing in the commonwealth shall have the right to become a subscriber of a medical service corporation if his qualifications meet those specified in the by-laws of such corporation, provided that such a corporation may, in its discretion, refuse to issue a subscription certificate to, or upon due notice cancel the subscription certificate of, any person if such person has made any fraudulent claim or representation to the corporation or to a participating physician, or has been guilty of uncooperative or unethical dealings with the corporation, or has failed to pay dues and assessments seasonably and promptly or for any other cause which may be approved by the commissioner.

Section 6. A subscription certificate shall be issued to each subscriber of a medical service corporation. No subscription certificate shall be issued unless the commissioner shall have approved in writing the form of certificate nor unless it contains in substance the following provisions:

(a) A statement of the medical service to be paid for by the corporation, and if any medical service is excepted, a statement of such exception.

(b) A statement of the duration of the agreement and of the terms and conditions upon which it may be

extended, renewed, revised, canceled or otherwise terminated.

(c) A statement of the period of grace which will be allowed for making any payment due from the subscriber under the contract, which in any event shall not be less than thirty days.

A subscription certificate may incorporate by reference the by-laws, rules and regulations of a medical service corporation provided a copy of the said by-laws, rules and regulations is available upon request to any subscriber.

Section 7. Every registered physician shall have the right on complying with such regulations as the corporation may make to enter into a written agreement with a medical service corporation doing business in the city or town where the said physician resides or has his usual place of business to perform general or special medical service. This chapter shall not change the normal relations between physician and patient. No restriction shall be placed by any such corporation upon its participating physicians as to methods of diagnosis or of treatment. No officer, agent or employee of a medical service corporation shall influence or attempt to influence a subscriber or a covered dependent in his choice of a participating physician. A subscriber or a covered dependent, subject to the by-laws, rules and regulations of a medical service corporation and the terms and provisions of his subscription certificate, shall be entitled to the benefits of this chapter upon receiving medical service from any participating physician or, in the discretion of the corporation, upon receiving medical service from any non-participating physician in an emergency or when outside the commonwealth. A corporation may terminate its agreement with any participating physician at any time (a) for failure to comply with the reasonable rules and regulations of such corporation, including without limitation such rules as may be adopted governing the keeping of accounts, records, and statistics, the making of reports and proof of services rendered, or (b) for presenting any fraudulent, unreasonable, or improper claim for payment, or compensation.

Section 8. Every medical service corporation shall annually, on or before the first day of March, file in the office of the commissioner a statement, verified by at least two of the principal officers of said corporation, showing its condition as of the thirty-first day of December next preceding. Such statement shall be in such form and shall contain such matters as the commissioner shall prescribe. A corporation neglecting to file its annual statement within the term herein specified shall forfeit one hundred dollars for each day during which such neglect continues, and upon notice by the commissioner to that effect, its authority to do business shall cease while such default continues.

Section 9. The commissioner, or any deputy examiner or any other person designated by the commissioner, shall, at least once in three years, and whenever the commissioner deems it prudent, visit any medical service corporation and examine into its affairs. The commissioner shall have free access to all of the books, records and papers of the corporation, and may summon and examine under oath its officers, agents, employees and other persons in relation to its affairs and condition. The commissioner shall require every such corporation to keep its books, records, accounts and vouchers in such manner that he or his authorized representatives may readily verify its annual statement and determine whether the corporation has complied with the law.

Section 10 The funds of a medical service corporation shall be invested only in such securities as are permitted by chapter one hundred and seventy five for the investment of the capital of insurance companies, or it may deposit the whole or any portion of its funds in any savings bank or savings department of a trust company or organized under the laws of the commonwealth or a national banking association. It shall have the right to acquire and own real estate to be occupied by itself in the transaction of its business. The commissioner may require any such corporation after the first full calendar year of doing business to accumulate and maintain a special contingent surplus, over and above its reserves and liabilities in such amount as the commissioner may deem proper.

Section 11 Unless each such payment is first authorized by a vote of its board of directors, no medical service corporation shall pay any salary, compensation or emolument to any officer, trustee or director thereof, or any salary, compensation or emolument to any person amounting in any year to more than five thousand dollars. No such corporation shall make any agreement with any of its officers, trustees or employees whereby it agrees that for any services rendered or to be rendered to it, they shall receive any salary, compensation or emolument for a period of more than three years from the date of such agreement.

Section 12 Any dispute or controversy arising between a medical service corporation and any participating physician, or any subscriber, or any person whose subscription certificate has been canceled or to whom such corporation has refused to issue a certificate as provided in section six may within thirty days after such dispute or controversy arises be submitted by any person aggrieved to a board serving in the division of insurance and consisting of the commissioner or a person designated by him the chairman of the board of registration in medicine or a person designated by him, and the attorney general or a person designated by him, for its decision with respect thereto. All decisions and orders of the board or of the commissioner made under any provision of this chapter may be revised as law and equity may require upon a petition in equity filed, within ten days after the promulgation of such decision or order in the superior court within and for the county of Suffolk by any party aggrieved by such decision or order.

Section 13 If the commissioner is satisfied as to any medical service corporation, that (1) it has failed to comply with the provisions of its charter, or (2) it is being operated for profit, or (3) it is fraudulently conducted, or (4) its condition is such as to render its further transaction of business hazardous to the public or to its subscribers, or (5) its officers and agents have refused to submit to an examination under section nine, or (6) it has exceeded its powers, or (7) it has violated any provision of law, or (8) it has compromised, or is attempting to compromise, with its creditors on the ground that it is financially unable to pay its claims in full or (9) it is insolvent he may apply to the superior court within and for the county of Suffolk for an injunction restraining it from further proceeding with its business. The court may forthwith issue a temporary injunction restraining the transaction of any business, and it may, after a full hearing make the injunction permanent, and appoint one or more receivers to take possession of the books, papers, moneys and other assets of the corporation, settle its affairs and distribute its funds to those entitled thereto, subject to such rules and orders as the court may prescribe.

Section 14 Every medical service corporation is hereby

declared to be a charitable corporation. No such corporation shall be liable for injuries resulting from negligence or malpractice on the part of any participating physician or of any of its employees. Every such corporation shall be exempt from all provisions of the insurance laws of the commonwealth, except as otherwise provided in this chapter. The property of every such corporation shall be exempt from all state and local taxes and such corporation shall not be subject to any tax or excise on or with respect to its corporate franchise or with respect to the doing of business.

Section 15 It shall be unlawful for any person, firm, corporation or association, except a medical service corporation, to establish, maintain or operate a non-profit medical service plan, provided, however, that this chapter shall not render unlawful or affect any operation or activity of any company organized or to be organized under the provisions of chapter one hundred and seventy five, of any society or fraternal benefit society organized or to be organized under the provisions of chapter one hundred and seventy six, of any non-profit hospital service corporation organized or to be organized under the provisions of chapter one hundred and seventy six A, or of any corporation organized or to be organized under chapter one hundred and eighty, the existence, purposes, activities and operations of which were lawful or would have been lawful prior to the enactment of this chapter.

Section 16 The provisions of this chapter may be enforced by a bill in equity brought in the superior court within and for the county of Suffolk or in the county where any defendant resides or has his or its usual place of business to be brought by the commissioner, the attorney general, or any district attorney.

COMMITTEE TO CONSIDER NEW OFFICERS AND BY LAWS

Following the Council meeting of October 2, 1940, a committee was appointed by the president of the Massachusetts Medical Society to study the desirability of establishing the offices of president elect and full time or executive secretary and to suggest the necessary changes in the by laws required to create these positions. The committee believes that these two new positions are desirable and has consequently formulated the changes in the by laws necessary for the creation of these offices.

In respect to the second part of its duties, that is, to study the propriety of altering the constitution and by laws in such a way that they would conform to those of other state medical societies, the committee reports that any attempt in the nature of redistricting involves too great a change in policy for a committee of this sort, which is probably not sufficiently representative, to act upon.

The committee has seen no need of altering the nomenclature of the governing body, the Council, or its method of election. It does recommend the creation of an Executive Committee of the Council—a smaller body, selected in such a way

as fairly to represent, geographically and numerically, the fellows of the Massachusetts Medical Society.

There is also submitted a table to explain the units represented by the elected members of the Executive Committee. (The ease of geographic division is apparent if one refers to the map of the district societies in the *Directory*.)

The changes in the by-laws necessitated by the creation of the offices of president-elect and executive secretary and the creation of an Executive Committee of the Council follow.

JOHN HOMANS, *Chairman*,

JOHN FALLON,

PEIRCE H. LEAVITT,

FRANK R. OBER,

WALTER G. PHIPPEN, *ex-officio*,

AUGUSTUS THORNDIKE, JR.

* * *

CHAPTER III

DISTRICT SOCIETIES

Section 5. (Additional.)

The councilors of each district society shall meet as soon as possible after the annual meeting of the district society in 1941 and elect two or more of their number to serve as candidates for the Executive Committee of the Council in accordance with chapter IV, section 10; and thereafter in a similar manner they shall choose new candidates from time to time.

Section 7. (Additional.)

The secretary of each district society as soon as possible after the annual meeting of the district society in 1941 shall call together its councilors for the purpose of selecting the candidates for the Executive Committee of the Council and shall send the names of those chosen to the Secretary of the general Society. He shall see that new candidates are chosen in a similar manner to fill vacancies as they occur, in accordance with chapter IV, section 10.

CHAPTER IV

THE COUNCIL

Section 1. The Council shall consist of councilors chosen by the district societies, and the President, ex-presidents, President-Elect, Vice-President, vice-presidents *ex officio*, Secretary and Treasurer of the general Society, secretaries of the district societies, and the chairman of each standing committee.

Section 3. The Council at its annual meeting, on nomination by the Nominating Committee and/or from the floor, shall elect by ballot officers of the Society as follows: President-Elect, who shall serve as President-Elect until the annual meeting of the Society next ensuing after his election and shall become President on his installation in the course of that meeting, serving thereafter as President until the next following annual meeting and the installation of his successor; a Vice-President, Secretary and Treasurer, all of whom shall assume the duties of office at the close of the annual meeting of the Society and shall hold office until their successors have been duly elected; except only that at the annual meeting of the Society in 1941 there shall be nominated and elected a President to

serve for that year. Councilors only shall be eligible to the offices above named. Upon nomination by the Nominating Committee, it shall elect by ballot a fellow to deliver an oration at the annual meeting of the Society the following year.

Upon nomination by the Nominating Committee, it shall elect by ballot members of the Executive Committee representing, respectively, the various units of district societies in accordance with section 10 of this chapter.

Section 10. The Executive Committee shall consist of the President, President-Elect, Vice-President, Treasurer and Secretary *ex officio*, the chairmen of the following standing committees, namely, Ethics and Discipline, Financial Planning and Budget, Membership, Publications and State and National Legislation, and those members elected by the Council.

The elected members, all of whom shall be councilors, shall be chosen, respectively, from geographical units of the Society so arranged that each member of the Executive Committee shall represent at least five hundred fellows of the Society as of January 1, 1941; except that if the number of fellows in any unit shall thereafter fall below five hundred, that unit shall still be entitled to its member, unless the Council orders otherwise.

These members shall be nominated and elected in the following manner:

(a) The councilors of each district society shall meet as soon as possible after its annual meeting in 1941 and in a similar manner at stated intervals thereafter, as specified below, to choose two of their number for presentation to the Nominating Committee; except that the councilors of any district society which alone represents one unit shall choose four nominees, and except that the councilors of any district society having more than five hundred fellows shall choose two additional nominees for each additional five hundred fellows or major fraction thereof.

(b) From the list of nominees representing each unit, the Nominating Committee shall choose, for election at the next annual meeting of the Council, at least twice the number of names eligible for election from that unit.

(c) From the list of councilors offered by the Nominating Committee, the Council at its annual meeting shall elect by ballot, to represent each unit of district societies, one or more members to serve on the Executive Committee, according to the following plan, which may be altered by the Council at its annual meeting from time to time:

From Berkshire, Franklin, Hampden and Hampshire, designated as the Western Unit, one member.

From Worcester and Worcester North, designated as the Worcester Unit, one member.

From Middlesex North, Middlesex South and Middlesex East, designated as the Middlesex Unit, two members.

From Essex North and Essex South, designated as the Essex Unit, one member.

From Suffolk, designated as the Suffolk Unit, one member.

From Norfolk and Norfolk South, designated as the Norfolk Unit, two members.

From Plymouth, Bristol North, Bristol South and Barnstable, designated as the Cape Unit, one member.

(d) The members of the Executive Committee shall serve for three years and shall not be eligible for reelection

before the expiration of three years following the conclusion of their terms of office, except that in 1941 three members shall be selected by lot to serve one year, three members shall be selected by lot to serve two years and three members shall be selected by lot to serve three years. Thereafter three members shall be elected every year to succeed in office those whose terms are about to expire.

Basis for Election of Members of Executive Committee of the Council

UNIT	COMPONENT DISTRICT SOCIETIES	No. OF FELLOWS*	No. NOMINATED BY COUNCIL OF EACH DISTRICT SOCIETY	No. NOMINATED BY NOMINATING COMMITTEE TO COUNCIL FOR ELECTION	No. ELECTED BY COUNCIL
Western	Franklin	52	2		
	Berkshire	126	2		
	Hampden	343	2	2 or more	1
	Hampshire	73	2		
		604			
Worcester	Worcester	436	2	2 or more	1
	Worcester North	109	2		
		545			
Middlesex	Middlesex North	144	2		
	Middlesex South	1043	4	4 or more	2
	Middlesex East	137	2		
		1324			
Essex	Essex North	224	2		
	Essex South	325	2	2 or more	1
		549			
Suffolk	Suffolk	714	4	2 or more	1
Norfolk	Norfolk	888	4		
	Norfolk South	156	2	4 or more	2
		1044			
Cape	Plymouth	163	2		
	Bristol North	73	2		
	Bristol South	213	2	2 or more	1
	Barnstable	52	2		
		501			

*Based on figures of December 26, 1940

and shall be nominated by the councilors of the various district societies concerned, as already described in subsections a, b and c of this section, unless the Council otherwise directs.

The Executive Committee shall meet at the call of the President at least once in each interval between Council meetings and may meet more often at the pleasure of the President. It shall assist the President in preparing for the consideration of the Council matters calling for action by the Council at its next meeting. It shall authorize action when circumstances require it, subject to the approval of the Council. It shall perform such other duties as the Council may require.

The consent of the Executive Committee shall be required to confirm the appointment, upon nomination by the President, of the Executive Secretary of the Society.

Upon request, members of the Executive Committee shall be paid the amount of their traveling expenses from the funds of the Society.

CHAPTER V

CENSORS AND SUPERVISORS

Section 1 The supervisors, representing the censors of the several district societies, shall constitute a board, which

shall meet annually on the day appointed for the annual meeting of the Council. The board shall elect a chairman, who shall have power to call special meetings. Five supervisors shall constitute a quorum. The secretary or executive secretary of the general Society shall act as secretary of the board. He shall keep a permanent record of the proceedings of the board, and shall provide, at the expense of the Society, papers and forms necessary for conducting examinations of applicants for fellowship. The board at its annual meeting shall adopt a uniform plan for the examination of applicants. The supervisors shall be paid the amount of their traveling expenses from the funds of the Society.

CHAPTER VI

OFFICERS

Section 1 (Additional)

He shall call at least one meeting of the Executive Committee of the Council between Council meetings and may call more meetings if he so desires.

Section 2 In the absence of the President, the Vice President shall perform all the duties of the President, and in the absence of both, the senior Vice President *ex officio* in point of membership shall perform the duties of the President.

Section 3 The President Elect shall assist the President in the performance of his duties in such a manner as the President may direct and in so doing shall be considered to represent the President.

In the absence of the President Elect, the Council, at its next annual meeting, shall, upon nomination by the Nominating Committee and/or from the floor, elect a President.

Section 4 The Secretary may assign to the Executive Secretary any or all of the duties now to be enumerated, except as specified below.

The Secretary shall attend all meetings of the Society and of the Council, and shall record their respective proceedings in separate record books, and this duty he may not assign.

He shall cause to be engrossed and shall sign the diplomas of new fellows if satisfied that they have met the requirements of sections 1 and 2 of chapter I, and shall issue all diplomas and certificates of fellowship. He shall notify individual fellows, in appropriate instances, of votes by the Council granting permission, as the case may be, to retire, to resign, to change district membership, to have dues remitted, or of votes depriving them of the privileges of fellowship, and these duties he may not assign.

He shall act *ex officio* as secretary of all boards of trial, and this duty he may not assign.

He shall have custody of the seal of the Society and of all books, papers, manuscripts, prints and paintings belonging to the Society, except such as are in charge of the Treasurer, and this duty he may not assign.

He shall act *ex officio* as secretary of the Board of Supervisors and of the Committee on Publications and the Committee on Ethics and Discipline, and shall keep the records of each in a separate volume. He shall have custody of all records as thus kept.

He shall issue notices of the meetings of the Council one month before the annual meeting of the Society. He shall issue to every fellow a program which shall contain (a) notification of the time and place of the annual meeting, (b) notification of the stated meetings of the Council for the year, and the meetings of the boards of censors, (c) information concerning the payment of assessments, and the distribution of publications.

He shall record the *Proceedings of the Council and of the Society*. He shall keep a complete list of the fellows of the Society, with their addresses so far as known. He shall transfer fellows from one district to another under the terms of chapter III, section 2, and shall report to the Society at its annual meeting the changes in membership of the Society during the year.

He shall conduct the official correspondence of the Society, and shall notify officers, delegates, and members of the committees of the general Society of their appointments and of their duties.

Under the direction of the Committee on Publications he shall issue at such intervals as may be determined by the Council a directory of officers and fellows of the Society, which shall be furnished upon request to fellows who are not in arrears.

He shall perform such other duties as the Society or the Council may require.

Section 5. The Executive Secretary shall be chosen by the Executive Committee of the Council upon nomination by the President. He shall hold office for one year or until his successor has been duly elected.

He shall perform such duties as are assigned to him in section 4 of this chapter and by the Executive Committee. In general, he shall assist the officers of the Society and such standing and other committees as may request his services, and his preoccupation shall be the service of the Society.

He shall attend all meetings of the Council and, on request, attend the meetings of the Executive Committee of the Council, but shall not vote in either.

The Executive Secretary need not be a fellow of the Society and nothing in this section shall forbid the choice of a woman for the office.

COMMITTEE ON MEDICAL EDUCATION AND MEDICAL DIPLOMAS

The Committee on Medical Education and Medical Diplomas has been directed by the Council to submit changes in the by-laws relative to the admission to the Society of graduates of medical schools not on the list recognized by the Council. At the next meeting of the Council the committee will submit proposed changes in the by-laws designed to accomplish the following:

1. To change its name to the Committee on Medical Education.
2. To change the date of the fall censors' examination from the first Thursday in November to the first Thursday in December.
3. To collect an examination fee of three dollars from each applicant examined by the censors.
4. To disqualify an applicant failing two examinations from again applying until three years have passed.
5. To set definite dates for filing applications, publication of names in the *Journal* and so forth.
6. To institute sponsorship by a fellow of the Society for each applicant who is a graduate of an unrecognized school.
7. To institute a local board of membership for each district society composed of the president, secretary and supervising Censor, who shall have the responsibility of interviewing each applicant who is a graduate of an unrecognized school, collecting information about him, and submitting recommendations to the Committee on Medical Education as to whether or not

he should be allowed to appear before the censors. The Committee on Membership shall render the final decision, as at present.

8. To give power to the Committee to change the list of medical schools recognized by the Council whenever such action appears necessary to the Committee.

With the approval of the Committee on Ethics and Discipline there will also be submitted proposed changes in the by-laws designed to accomplish the following:

9. To have an investigation by the local board of membership of every former fellow who seeks readmission to the Society, the recommendations to be submitted to the Committee on Membership, which shall report to the Council. When a resignation has been requested by the Committee on Ethics and Discipline, or where deprivation has occurred for a reason other than non-payment of dues, the board shall consult with the Committee on Ethics and Discipline. No applicant for readmission to the Society shall appear before the board of censors.

JOHN P. MONKS, *Chairman*.

COMMITTEE ON MEMBERSHIP

At the February meeting of the Council a recommendation, to provide for a remission of dues of fellows who are called to full-time service in the United States Army, Navy or Public Health Service, will be presented:

Fellows of the Society who are called to full-time service in the United States Army, Navy or Public Health Service during the present emergency and whose livelihood is thereby impaired may, on written application to the Treasurer stating their situation, have their dues remitted for the year of service. A period of full-time service greater than six months shall give the privilege of a year's remission of dues. The *New England Journal of Medicine* will only be sent to such members on payment of an annual fee of four dollars (\$4.00). The President of the Society shall determine the end of the present emergency.

G. COLKET CANER, *Chairman*.

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

PREGNANCY COMPLICATED BY CARDIAC DECOMPENSATION AND RESULTING IN DEATH

Mrs. M. P., a twenty-three-year-old primipara, was referred by her family doctor on January 8, 1924, when she was approximately four months pregnant.

The family history was essentially noncontributory. The patient had rheumatic fever at the age

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

of eight years and was kept in bed for six weeks. There was no history of any other disease. A tonsillectomy was performed when the patient was twelve years old. Catamenia began at thirteen, were regular with a twenty-eight-day cycle and lasted four days. The last period began on September 15, 1923, making the expected date of confinement June 22.

Physical examination on January 8 revealed a well developed and well nourished young woman. The weight was 128 pounds. The lungs were clear and resonant; there were no rales. The heart showed definite evidence of mitral stenosis. The blood pressure was 112 systolic, 60 diastolic. The abdomen was negative except for a uterus that was enlarged to a size consistent with the period of amenorrhea. Vaginal examination revealed the cervix to be soft.

On January 29 the weight was 132 pounds. The patient was seen by a medical consultant after she disclosed that she had had some precordial distress and had coughed up blood on two occasions. The consultant's note read as follows:

The patient has a poor heart muscle. The blood pressure is 100/60, the pulse rate 120. The apex impulse is in the 5th intercostal space, 10 cm to the left of the mid-sternal line, the dullness on the right extends 3 cm from the midline, there is slightly increased dullness upward. The apex impulse is light and tapping, and there is some soreness of chest. There is a presystolic thrill, the heart action is regular. At the apex, the first sound is sharp, there are presystolic and systolic murmurs. The pulmonary and aortic second sounds are sharp and clear. There is a question of a few crackles in the right base. Diagnosis: mitral stenosis.

Following this visit the patient was kept in bed for ten days.

On March 19 she complained that she had been having considerable epigastric distress, and she was seen by another medical consultant. At this time she was in the hospital because of discomfort and for the purpose of rest. The consultant concurred in the diagnosis of mitral stenosis and advised that she lead a very quiet life; he also suggested that she be delivered by cesarean section.

On May 1 the patient had an attack of decompensation in the middle of the night. She complained of great difficulty in breathing, and vomited. The pulse was 120. She was advised to stay in bed from then until delivery.

On May 15 she had a slight cold, but her pulse remained about 90 and her condition seemed satisfactory. She was seen at home on May 20, at which time the blood pressure was 118 systolic, 60 diastolic and the pulse 90.

One week later, when the patient was approximately thirty six weeks pregnant, the heart again

became decompensated. She vomited blood and coughed a great deal. The pulse was over 100, and she was pale. She was taken immediately to the hospital, where her condition became steadily worse. She started in labor, and died undelivered on May 28.

Comment. In 1924 the treatment of pregnancy complicated by cardiac disease was little understood, and the complication not particularly well handled. In this case the mitral stenosis dated back to the rheumatic fever and in retrospect the patient never should have become pregnant. When she was first seen by the family physician, the question of therapeutic abortion should have been entertained. When the patient was first seen by the obstetrician at about four months, the problem appeared very grave, but because of the scruples of the family, it was decided to allow the pregnancy to continue.

During her pregnancy there were several attacks of decompensation. The patient was hospitalized once, and was in bed at home a good part of the last months of her pregnancy. In spite of this, decompensation occurred, followed by labor and death. Today, therapeutic abortion and sterilization would be advised very strongly as soon as the patient was seen. Electrocardiograms would be taken. If abortion were refused, such a patient should be hospitalized practically all the time.

It is now believed that in such cases the peak of the load becomes less after the thirty-sixth week, and that many cases go on to spontaneous delivery. There is still a question whether patients as sick as this one should not be delivered by cesarean section under spinal or local anesthesia as soon as viability is established, or at the first signs of cardiac failure.

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning January 19

MIDDLESEX EAST

Tuesday, January 21, at 4 15 p.m., at the Melrose Hospital, Melrose. Chemotherapy in the Treatment of Gonococcal Infection. Instructor Sylvester B. Kelley. Walter H. Flanders, *Chairman*.

MIDDLESEX SOUTH

Tuesday, January 21, at 4 00 p.m., at the Cambridge Hospital, Mt. Auburn Street, Cambridge. Technique and Treatment of Primary, Secondary and Tertiary Syphilis. Instructor Rudolph Jacoby. Dudley Merrill, *Chairman*.

NORFOLK

Thursday, January 23, at 8:30 p.m., at the Norwood Hospital, Norwood. Diagnosis and Treatment of Minor Lesions of Rectum and Anus. Instructor: E. Parker Hayden. Hugo B. C. Riemer, *Chairman*.

NORFOLK SOUTH

Monday, January 20, at 8:30 p.m., at the Quincy City Hospital, Quincy. Obstetric Infections: Diagnosis and treatment. Instructor: John Rock. David L. Belding, *Chairman*.

SUFFOLK

Thursday, January 23, at 4:30 p.m., in John Ware Hall, Boston Medical Library. Pediatric Case Discussions. Instructor: Edwin H. Place. Reginald Fitz, *Chairman*.

NEW HAMPSHIRE MEDICAL SOCIETY

DEATHS

HUSE—ERNEST L. HUSE, M.D., aged sixty, died at Meriden on December 20, 1940. He was known to many as one of the last of the so-called "country doctors."

Dr. Huse graduated from Dartmouth Medical School in 1907. A former president of the Sullivan County Medical Association, he had practiced in Meriden for thirty-one years.

Survivors are his wife, Mrs. Helen Huse, and two sons, E. Leslie, of Allenhurst, New Jersey, and Raymond A., of Hackensack, New Jersey.

MORRILL—SIBLEY G. MORRILL, M.D., of Concord, died Saturday, December 28, 1940, after a long illness. He was born in Concord in 1873, the son of Luther Sullivan and Mary Agnes (Gage) Morrill; he was the grandson of Dr. Charles P. Gage, who began a Concord practice in 1838. Dr. Morrill graduated from the Harvard Medical School in 1898. He had been president of the staff at Margaret Pillsbury General Hospital, consultant at the New Hampshire Memorial Hospital and the Pembroke Sanatorium and a member of the state and city boards of health.

Dr. Morrill was a fellow of the American Medical Association and a member of the New Hampshire Medical Society and the Center District Society.

He married Georgia Sherman in 1905, and after her death married Anna Wenzell. Two sons, Sibley S. Morrill, of San Francisco, and Roger S. Morrill, of Concord, survive him.

MISCELLANY

TUBERCULOSIS AND MILITARY SERVICE

Sixteen and a half million men have registered for military service. Almost one million of them have thus far been selected. According to news reports, the men will be subjected to a hardening process to the point where they will be able to march thirty miles per day bearing full equipment. It is highly important that among them there shall be none who, because of a tuberculous focus, will crack under the strain. So that costly lessons, learned during World War I may not go unheeded, Spillman in a recent article (*The value of radiography in detecting tuberculosis in recruits, J. A. M. A. 115:1371-1378, 1940*) summarizes the methods employed to discover tuberculosis, calculates the enormous cost of service-acquired tuberculosis and discusses what should be done to safeguard the

nation's manpower and financial resources against the enemy that bores from within.

World War I is twenty-two years behind us, yet the federal government pays in compensation for tuberculosis that originated in service about \$3,000,000 each month. Analysis of voluminous and complicated federal reports dealing with service-acquired tuberculosis yields the following approximate figures:

Cost of vocational training.....	\$129,000,000
Insurance	130,000,000
Compensation	600,000,000
Hospital care	100,000,000
	<hr/>
	\$959,000,000

The total number of men compensated for tuberculosis in 1922 (it is not feasible, from the annual reports, to run the figures back past 1922) was 36,600. In 1939, the total number was 55,634, including 1947 deaths for that year.

The expense of taking a man who has tuberculosis into the service cannot be accurately calculated because of many factors that are still unknown and costs that are not apparent, but the author estimates that the figure would be somewhere around \$10,000 per man to date, certainly not less than \$7500, to which should be added at least \$50 a month for the rest of the man's life, and compensation for his dependents after death.

Study of army procedure during World War I leads to the conclusion that the methods employed for the detection of tuberculosis were inadequate. This does not detract from the stature of that distinguished army surgeon, Colonel George E. Bushnell, the adviser to the Surgeon General on all matters pertaining to tuberculosis. It was the consensus of experts in 1917 that adult exogenous infection with tuberculosis is rare, that infection in childhood is well-nigh universal and that every infection confers an immunity to anything short of massive doses of tubercle bacilli in later life. By the same token, adult tuberculosis was held to result from a reactivation of the antecedent infection. It was thought that for every soldier who had *incurred* tuberculosis as a result of military service, ten others had *brought the disease with them* into the army. Present-day experience does not uphold this belief—to cite at random just one of numerous communications. Diehl and Myers proved the development of six cases of tuberculosis in one college fraternity a year after one of its members was found to have a positive sputum, and the development of tuberculosis in a girl several years after her sorority roommate was found to have tuberculosis.

The problem at hand is this: How can the recruit who already has active tuberculosis be recognized, so that he may be rejected for the protection of himself and others? Colonel Bushnell trained a large number of highly competent diagnosticians, to whom he imparted the significance of the post-tussal moist rale and the technic of eliciting it. The patient is instructed to cough gently at the end of deep expiration. When he inhales after the cough, the rale is heard. The presence of persistent moist rales was the criterion for determining the existence of tuberculosis. Several prominent physicians and radiologists tried to induce the Surgeon General to make the radiograph the decisive factor in the diagnosis of pulmonary tuberculosis. The practical difficulties in the way of the adoption of the radiograph were, however, insuperable, according to Colonel Bushnell, in which conviction he was supported by a special committee of the Council of National Defense that investigated the question. Among the difficulties were the enormous cost of photographing,

the impossibility of obtaining a sufficient number of plates (made of glass and most of it imported from Belgium) and the lack of trained radiologists

Draft boards set up in every community added to the difficulty. These boards included local physicians who were supposed to reject draftees with disqualifying defects. Although most draft boards functioned honestly and intelligently, there is evidence in official publications that, far from weeding out the manifestly tuberculous trainees, some boards actually concentrated tuberculosis at some of the camps, thinking that the men would benefit by change of climate and by army life. In the re-examination of 19,827 men at Camp Kerny, for example, 833 cases of tuberculosis (4.3 per cent) were discovered.

With this background, what should our procedure be in the present situation? Of the available methods for the mass diagnosis of tuberculosis among recruits, physical examination and radiography need to be considered on a basis of relative merits. Evidence of the inadequacy of physical examination to detect tuberculosis is overwhelming. The last word so far as the army was concerned in 1917 was that the only trustworthy sign of activity of apical tuberculosis is the presence of persistent moist rales. In the light of present day knowledge this sign is conclusive in only about 12.5 per cent. In spite of the acknowledged skill of the army examiners of 1917, only about one eighth of the actually existent, clinically significant tuberculosis was detected.

The radiograph should be the criterion in weeding out tuberculosis in today's mobilization. In what form? Fluorography gives no record and is highly subjective. As demonstrated by the experience of a large life-insurance company, fluorography in skillful hands may serve as an alternative to a prohibitively expensive routine of roentgenography, but even this company has, since 1936, been making routine roentgenograms of the chest of every applicant for employment.

The paper roentgenogram is speedy and convenient and cheaper than celluloid. Radiologists as a whole do not favor the paper radiogram, whereas tuberculosis workers are enthusiastic over it. If celluloid films were available on rolls like the paper rolls, they would undoubtedly be preferred. Paper roentgenograms are vastly preferred to no roentgenograms, but celluloid would be preferred if the author were given a choice.

Photography of the fluoroscopic screen is another possibility. But if this method, known as fluorography, is no more than 90 per cent efficient as compared with the standard celluloid roentgenogram, as Dr Spillman believes, the 10 per cent shortage in diagnosis would cost a great deal of money in compensation later. Fluorography is today a highly promising method but awaits further improvements before it can compete with celluloid roentgenograms.

For radiography there are many kinds of apparatus varying in price and capacity. What is most important, however, is the skill and knowledge of the operator.

The author's final conclusion is

A normal chest roentgenogram should be the criterion of acceptance in a future mobilization including the proposed draft for training, and it should be made and reported before the recruit has spent a night away from his own roof to obviate a repetition of the claims for aggravation of pre-existing tuberculosis which occurred during and after the World War.

Reprinted from *Tuberculosis Abstracts* January, 1941

RÉSUMÉ OF COMMUNICABLE DISEASES IN MASSACHUSETTS FOR NOVEMBER, 1940

DISEASE	NOVEMBER 1940	NOVEMBER 1939	FIVE YEAR AVERAGE*
Anterior poliomyelitis	4	7	14
Chicken pox	1269	947	908
Diphtheria	12	27	23
Dog bite	63	549	604
Dysentery bacillary	12	135	37
German measles	34	34	48
Scarlet fever	340	426	480
Lobar pneumonia	354	270	262
Measles	985	857	491
Meningococcus meningitis	8	2	4
Mumps	384	243	361
Paratyphoid B fever	3	1	4
Scarlet fever	480	64	493
Syphilis	40	419	493
Tuberculosis pulmonary	160	16	236
Tuberculosis other forms	1	10	23
Typhoid fever	5	5	4
Undulant fever	4	5	4
Whooping cough	889	505	580

*Based on figures for preceding five years

RARE DISEASES

Actinomycosis was reported from Brockton, 1, total, 1.
Anterior poliomyelitis was reported from Ashland, 1, Greenfield, 1, Hadley, 1, Worcester, 1, total, 4.
Diphtheria was reported from Chelsea, 2, Fall River, 5, Foxboro, 1, Sturbridge, 1, Wellesley, 2, Worcester, 1, total, 12.
Dysentery, amebic, was reported from Bridgewater, 1, Somerville, 1, total, 2.
Dysentery, bacillary, was reported from Boston, 1, Cambridge, 8, Everett, 1, Lowell, 2, total, 12.
Infectious encephalitis was reported from Palmer, 1, Springfield, 1, total, 2.
Malaria was reported from Cambridge, 2, total, 2.
Meningococcus meningitis was reported from Gloucester, 1, Lowell, 1, Malden, 1, Medford, 1, Methuen, 1, Milford, 1, Quincy, 1, Springfield, 1, total, 8.
Paratyphoid B fever was reported from Brockton, 1, Fall River, 1, Wellesley, 1, total, 3.
Pellagra was reported from Belmont, 1, total, 1.
Septic sore throat was reported from Boston, 5, Cambridge, 2, Lynn, 1, New Bedford, 1, Quincy, 1, Somerville, 1, Wrentham, 1, total, 12.
Tetanus was reported from Chelsea, 1, total, 1.
Trachoma was reported from New Bedford, 1, total, 1.
Trichinosis was reported from Winchester, 8, total, 8.
Typhoid fever was reported from Boston, 2, Cambridge, 1, Somerville, 1, Woburn, 1, total, 5.
Undulant fever was reported from Barre, 1, Dartmouth, 1, Lynnfield, 1, Plymouth, 1, total, 4.

Measles, mumps, meningococcus meningitis, lobar pneumonia and whooping cough were reported above the five year averages.

Pulmonary tuberculosis showed record low incidence. The incidence of undulant fever was not remarkable. Scarlet fever, diphtheria, German measles and anterior poliomyelitis were reported below the five year averages. Tuberculosis (other forms) was reported at a record low figure.

Diseases of the typhoid-paratyphoid group showed low incidence.

Dog bite was reported at a record high figure for the fourth consecutive month. Animal rabies was reported from Halifax, Hanson, Worcester, Spencer and Leicester.

CORRESPONDENCE

REVOCATION OF REGISTRATION

To the Editor: At the meeting of the Board of Registration in Medicine, held December 19, 1940, the Board canceled the registration as a practitioner of medicine in this Commonwealth and revoked the certificate of registration of Dr. Michael Litvich, 114 Shirley Avenue, Revere, Massachusetts, because of deceit in connection with an automobile accident case.

STEPHEN RUSHMORE, M.D., *Secretary*,
Board of Registration in Medicine.

State House,
Boston.

NOTICES

ANNOUNCEMENTS

G. MARSHALL CRAWFORD, M.D., announces the removal of his office from 416 Marlboro Street, Boston, to 1101 Beacon Street, Brookline.

JOHN C. TATE, M.D., announces the removal of his office from the Westfield State Sanatorium, Westfield, to 20 Maple Street, Springfield.

BOSTON DOCTORS' SYMPHONY ORCHESTRA



The Boston Doctors' Symphony Orchestra will rehearse under Alexander Thiede, formerly concertmaster of the Cleveland Symphony Orchestra, every Thursday at 8:30 p.m. Those interested in becoming members should com-

municate with Dr. Julius Loman, Pelham Hall Hotel, Brookline (BEA 2430).

CARNEY HOSPITAL

The monthly clinical meeting and luncheon of the Carney Hospital will be held in the auditorium of the Carney Hospital on Monday, January 20, at 11:30 a.m. Medical, surgical and gynecological case reports will be presented.

Physicians and medical students are invited to attend.

HARVARD MEDICAL SOCIETY

The next meeting of the Harvard Medical Society will be held on Tuesday, January 28, in the amphitheater of the Peter Bent Brigham Hospital at 8:15 p.m. Dr. Elliott C. Cutler will preside.

PROGRAM

Presentation of cases.

Carcinoma of the Pancreas. Dr. Frank Glenn, assistant professor of surgery, Cornell University Medical College.

NEW ENGLAND SOCIETY OF PHYSICAL MEDICINE

There will be a regular meeting of the New England Society of Physical Medicine at the Hotel Kenmore, Boston, on Wednesday, January 22, at 8:00 p.m. An informal dinner will be served in the Empire Room at 6:30 p.m.

PROGRAM

The Clinical Significance of the Electroencephalogram. Dr. Hallowell Davis.

Discussion by Miss Pauline A. Davis and Dr. H. Houston Merritt.

All members of the medical profession are cordially invited to attend.

NEW ENGLAND PEDIATRIC SOCIETY

There will be a meeting of the New England Pediatric Society on Wednesday, January 29. The clinical presentation will be held at the amphitheater, Joseph H. Pratt Diagnostic Hospital, and all other events at Longwood Towers, Brookline.

PROGRAM

4:00 Clinical meeting, Boston Floating Hospital. Dr. Elmer W. Barron and his associates.

6:30 Refreshments.

7:00 Dinner.

8:00 Annual meeting of the society.

Election of officers.

Report of the treasurer.

8:30 Pathologic Aspects of Adiposity. Dr. Sidney Farber.

NEW ENGLAND DERMATOLOGICAL SOCIETY

The next regular meeting of the New England Dermatological Society will be held on Wednesday, February 12, at the Massachusetts General Hospital. The clinic will start at 2 p.m. in the Skin Out-Patient Department.

HAMPDEN DISTRICT MEDICAL SOCIETY

The annual winter meeting of the Hampden District Medical Society will be held on Tuesday, January 21, at 4:00 p.m. in the rooms of the Springfield Academy of Medicine.

Dr. Tracy B. Mallory will present a paper on "Peptic Ulcer Formation" with lantern slides.

Luncheon will be served at 6:30 p.m. at the expense of the society.

MASSACHUSETTS DEPARTMENT OF CIVIL SERVICE AND REGISTRATION

School Physician, \$360 a Year, Lowell

School Physician, \$1000 a Year, Chicopee

Director of State Civil Service, Ulysses J. Lupien, has recently announced that competitive examinations are to be held on March 1 in order to find eligibles for appointment to the positions of school physician, Health Department, Lowell, and dispensary school physician, Health Department, Chicopee.

The entrance requirements are as follows: applicants must be registered physicians under the State Board of Registration in Medicine. The subjects and weights of the examinations are as follows: training and experience, 2; practical questions, 3; total, 5. Applicants must obtain a grade of 70 per cent in each subject in order to become eligible. The last date for filing applications is Saturday, February 15, at 12 o'clock noon.

WACHUSETT MEDICAL SOCIETY

The next meeting of the Wachusett Medical Society will be held on Wednesday, February 5, at the Holden District Hospital at 7:15 p.m. Dr. Chester S. Keefer will speak on "Recent Advances in the Treatment of Meningitis." Dinner will precede the meeting at 6:30 p.m.

NEW YORK UNIVERSITY COLLEGE OF MEDICINE

The date of the annual Alumni Day at the New York University College of Medicine has been changed from the usual Washington's Birthday to March 21 and 22, 1941. At this time, the Alumni Association is celebrating the one-hundredth anniversary of the founding of the medical college.

The program will begin with a dinner for all the alumni and their wives at Hotel Roosevelt on Friday, March 21. On Saturday, March 22, there will be a scientific session at the medical school during the morning and afternoon. There will be a luncheon in the lounge at the medical school, Dr. Nathan B. Van Etten, president of the American Medical Association, will be the speaker.

AMERICAN PUBLIC HEALTH ASSOCIATION

The seventieth annual meeting of the American Public Health Association will be held in Atlantic City, New Jersey, on October 14-17, with the Convention Hall as headquarters for the meeting and the Hotel Traymore as residence headquarters. The American School of Public Health, the International Society of Medical Health Officers, the Association of Women in Public Health, the Conference of State Sanitary Engineers, the Conference of Municipal Public Health Engineers, the Conference of State Provincial Public Health Laboratory Directors and a number of other related organizations will meet in conjunction with the association.

The annual meeting of the American Public Health Association will bring 3500 professional public-health workers to Atlantic City. A New Jersey committee responsible for entertainment, inspection trips and other local aspects of the meeting, is being formed under the direction of Dr. S. L. Salasin, health officer of Atlantic City.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, JANUARY 19

SUNDAY JANUARY 19

11 a.m. How Accidents Happen Dr. Henry C. Marble Free public lecture Harvard Medical School Building D

11 p.m. Various Phases of Plastic and Reconstructive Surgery (illustrated) Dr. Varaztad H. Karanjian Public health lecture Cambridge Hospital Margaret Jewett Hall

MONDAY JANUARY 20

11:30 a.m. Monthly clinical meeting and luncheon Carney Hospital
12:15-1:15 p.m. Clinicopathological conference Peter Bent Brigham Hospital amphitheater

TUESDAY JANUARY 21

9-10 a.m. Vitamin B Deficiency Dr. Stuart Mecklejohn. Joseph H. Pratt Diagnostic Hospital

12 m. The Relation of Pituitary Function and Mental Development Dr. George Levene South End Medical Club Headquarters of the Boston Tuberculosis Association 554 Columbus Avenue Boston

12:15-1:15 p.m. Clinicorontogenological conference Peter Bent Brigham Hospital amphitheater

WEDNESDAY JANUARY 22

9-10 a.m. Hospital case presentation Dr. S. J. Thannhauser Joseph H. Pratt Diagnostic Hospital

12 m. Clinicopathological conference Children's Hospital

*2-4 p.m. Abdominal Pain Drs. Elliott C. Cutler and Soma Weiss Peter Bent Brigham Hospital

8 p.m. Boston Society of Biologists Ether Dome Massachusetts General Hospital

*8 p.m. Clinical Significance of the Electroencephalogram Dr. Hal Lowell Davis New England Society of Physical Medicine Hotel Kenmore Boston

THURSDAY JANUARY 23

*8:30 a.m. Combined clinic of the medical surgical orthopedic and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital at the Children's Hospital

*9-10 a.m. Fissure in Ano Dr. E. T. Whitney Joseph H. Pratt Diagnostic Hospital

FRIDAY JANUARY 24

*9-10 a.m. Pregnancy Complicating Diabetes Dr. Priscilla White Joseph H. Pratt Diagnostic Hospital

SATURDAY JANUARY 25

*9-10 a.m. Hospital case presentation Dr. S. J. Thannhauser Joseph H. Pratt Diagnostic Hospital

*Open to the medical profession

10 open to the public

JANUARY 27—New England Heart Association Page 87, issue of January 9

JANUARY 28—Harvard Medical Society Page 134

JANUARY 29—New England Pediatric Society Page 134

JANUARY 30—Cutter Lecture Page 87, issue of January 9

FEBRUARY 5—Wachusett Medical Society Notice above

FEBRUARY 12—New England Dermatological Society Page 134

FEBRUARY 13—Peniueket Association of Physicians Page 263 issue of August 15

FEBRUARY 20-22—American Orthopsychiatric Association Inc. Page 999 issue of December 12

MARCH 8—American Board of Ophthalmology Page 201 issue of August 1

MARCH 12-14—New England Hospital Assembly Hotel Statler Boston

MARCH 21-22—New York University College of Medicine Alumni Day Notice above

APRIL 21-25—American College of Physicians Page 1065, issue of June 20

MAY 21-22—Massachusetts Medical Society Boston

JUNE 2-6—American Medical Association Cleveland Ohio

OCTOBER 14-17—American Public Health Association Notice above

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

FEBRUARY 5—Gastric and Duodenal Ulcer Diagnosis and treatment Dr. Arthur Allen Lynn Hospital

MARCH 5—X-ray in Heart Disease Dr. Merrill C. Sosman Essex Sanatorium Middleton

APRIL 2—Pediatric Problems in General Practice Dr. Joseph Garland Addison Gilbert Hospital Gloucester

MAY 14—Relation of the Doctor to the Law Mr. Leland Powers New Ocean House, Swampscott

FRANKLIN

MARCH 11.

MAY 13

Meetings will be held at 11 a.m. at the Franklin County Hospital Greenfield

HAMPTDEN

JANUARY 21—Page 134

NORFOLK

JANUARY 28—Carney Hospital

FEBRUARY 25—Medical college meeting 8:30 p.m. Hotel Puritan Boston

MARCH 25—To be announced

MAY 8—Censors meeting Hotel Puritan

SUFFOLK

JANUARY 29—Page 604 issue of October 10

APRIL 30—Page 604 issue of October 10

WORCESTER

FEBRUARY 12—Worcester State Hospital Worcester

MARCH 12—Memorial Hospital Worcester

APRIL 9—Hahnemann Hospital Worcester

Supper at 6:30 p.m. followed by a business meeting and scientific program

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

Methods of Treatment. By Logan Clendening, M.D., clinical professor of medicine, Medical Department, University of Kansas, and attending physician, University of Kansas Hospitals; and Edward H. Hashinger, M.D., clinical professor of medicine, Medical Department, University of Kansas, attending physician, University of Kansas Hospitals, and attending physician, St. Luke's Hospital, Kansas City, Missouri. Seventh edition. 8°, cloth, 997 pp., with 138 illustrations. St. Louis: C. V. Mosby Company, 1941. \$10.00.

Foreign Bodies Left in the Abdomen. The surgical problems: cases, treatment, prevention. The legal problems: cases, decisions, responsibilities. By Harry Sturgeon Crossen, M.D., School of Medicine, Washington University, St. Louis; and David Frederic Crossen, LL.B., School of Law, Washington University. 4°, cloth, 762 pp., with 212 illustrations, including 4 color plates. St. Louis: C. V. Mosby Company, 1940. \$10.00.

Clinical Pellagra. By Seale Harris, M.D., professor emeritus of medicine, University of Alabama, Birmingham, Alabama; assisted by Seale Harris, Jr., M.D., formerly assistant professor of medicine, Vanderbilt University School of Medicine, Nashville, Tennessee. With foreword by E. V. McCollum, Ph.D., Sc.D., LL.D., professor of biochemistry, School of Hygiene and Public Health, Johns Hopkins University, Baltimore. 4°, cloth, 494 pp., with 66 illustrations and 4 color plates. St. Louis: C. V. Mosby Company, 1941. \$7.00.

Doctor in Arabia. By Paul W. Harrison, M.D. 8°, cloth, 303 pp., with 9 illustrations. New York: John Day Company, 1940. \$3.00.

Diagnosis and Treatment of Menstrual Disorders and Sterility. By Charles Mazer, M.D., assistant professor of gynecology and obstetrics, Graduate School of Medicine, University of Pennsylvania, and gynecologist, Mount Sinai Hospital, Philadelphia; and S. Leon Israel, M.D., instructor in gynecology and obstetrics, School of Medicine, University of Pennsylvania, and associate gynecologist, Mount Sinai Hospital. 8°, cloth, 485 pp., with 108 illustrations. New York: Paul B. Hoeber, Incorporated, 1940. \$6.50.

The Doctor and the Difficult Child. By William Moodie, M.D., F.R.C.P., D.P.M., medical director, London Child Guidance, Clinic and Training Centre. 8°, cloth, 214 pp. New York: The Commonwealth Fund, 1940. \$1.50.

The Endocrine Function of Iodine. By William Thomas Salter, M.D., assistant professor of medicine, Harvard Medical School, and associate physician, Thorndike Memorial Laboratory, Boston City Hospital. 8°, cloth, 351 pp., with 45 tables and 40 illustrations. Cambridge: Harvard University Press, 1940. \$3.50.

Lipidoses: Diseases of the cellular lipid metabolism. By Siegfried J. Thannhauser, M.D., Ph.D., formerly professor of medicine, University Clinic, Freiburg, Germany, associate professor of medicine, Tufts College Medical School, and associate chief, Joseph H. Pratt Diagnostic Hospital,

Boston. Edited by Henry A. Christian, M.D., LL.D., Hon. Sc.D., Hon. F.R.C.P. (Can.), Hersey Professor of the Theory and Practice of Physic, emeritus, Harvard University, and physician-in-chief, emeritus, Peter Bent Brigham Hospital, Boston. (Reprinted from Oxford Loose-Leaf Medicine). 8°, cloth, 370 pp., with 78 illustrations. New York: Oxford University Press, 1940. \$6.00.

Hydrotherapy in Psychiatric Hospitals. By Rebekah Wright, M.D., hydrologist, Massachusetts Department of Mental Health. 8°, cloth, 334 pp., with 91 illustrations. Boston: The Tudor Press, 1940. \$4.00.

Treatment in General Practice. Surgery (continued). Articles republished from the *British Medical Journal*. Vol. IV. 8°, cloth, 562 pp., with 143 illustrations. London: H. K. Lewis and Company, Limited, 1940. 16s net.

A Surgeon's Life: The autobiography of J. M. T. Finney. 8°, cloth, 396 pp. New York: G. P. Putnam's Sons, 1940. \$3.50.

Bellevue. By Lorraine Maynard. In collaboration with Laurence Miscall, M.D. 8°, cloth, 280 pp. New York: Julian Messner, Incorporated, 1940. \$2.50.

BOOK REVIEWS

Behind the Scenes of Murder. By Joseph Catton, M.D. 8°, cloth, 355 pp. New York: W. W. Norton & Company, Incorporated \$3.00.

In the last twenty years the psychiatrist has become an important factor in the medicolegal aspect of homicide. With the gradual passing of the undignified and often useless "battle of experts" for the prosecution and for the defence, the court, in many states, now appoints before trial a psychiatrist or a board of mental experts to examine all persons accused of a capital crime. The findings are available for counsel of each side as well as for the judge. The author of this book has served various courts on the Pacific Coast as an independent expert for the last twenty-five years. His experience has been wide, and many persons of national "notoriety" have come under his observation, such as Mrs. Judd, William Hickman, and the Massies of Honolulu. Each case is separately analyzed, with a brief psychiatric summary of the accused person's reactions under examination. In most cases, the author allows the individual to tell his own story, and much of the book contains what purports to be actual statements and verbatim reports of conversations or exchanges between the witness and the lawyer on the stand.

This is not a learned scholarly account of the subject, but a semipopular treatise designed to interest the public as well as the medical profession. The tone in general is conservative, the author's reactions being well within the usually accepted standards of present-day psychiatry. The style is somewhat flamboyant, but for a discerning reader this should not obscure the basic soundness of the author's contentions. He is a staunch defender of complete psychiatric examination of accused persons, deplors such terms as "temporary insanity" and believes that we are not ready to substitute any known method of psychological third degree, such as "lie detectors" or "truth-telling serum" (scopolamine), for the fifth amendment to the Constitution: "No person charged with a criminal offense shall be forced to testify against himself."

Dr. Catton has no cure for homicide. Given the mental components of a slayer and the proper environment, any person might commit a crime. Constitutional defectiveness, in the psychiatric sense, is commonly found in

most slayers, alcohol and other drugs, the passions of jealousy, lust, rage and sadism, all are frequent environmental factors. Few murderers are insane, and psychiatry can offer little or nothing towards preventing one half the number of murders which are scheduled for tomorrow. Of the other half, early diagnosis and commitment of the 'psychopaths,' many with long criminal records, will help remove what Dr Catton succinctly describes as "an invitation to murder." Other preventive measures are those well known under the general term of "social psychiatry." The main feature of a psychiatric approach to crime prevention should be, in Dr Catton's opinion, clinical group study, such as that carried on by the Judge Baker Foundation in Boston, in addition to continuing, directing jurisdiction over the offender by the clinic. Up to now, as soon as control is relinquished, men again commit crime, even murder. The key to crime prevention is therefore a continued psychiatric supervision.

This thought-provoking book is well printed. It carries an adequate index and a useful appendix with definitions of degrees of homicide, "triability tests," "responsibility tests" and other pertinent matters of law as used in the various states.

Obesity and Leanness By Hugo R. Ronj, M.D. 8°, cloth 300 pp., with 32 illustrations. Philadelphia Lea & Febiger, 1940 \$3.75

The value of this careful monograph lies in its stimulating presentation of the unsolved problems of its subject, rather than in any important discoveries in their solution. Obesity and leanness are rightly viewed as aspects of the same fundamental problem,—namely, why some persons go through life oversupplied with adipose tissue, whereas others, often in an apparently identical environment, remain desperately thin.

The book begins with chapters on the physiology and metabolism of fats in the body, followed by discussions of the caloric balance, the mechanisms of hunger, appetite and satiety, and the specific dynamic action of foods. The role of the endocrines, including the thyroid and pituitary glands and the pancreatic islets, and the influence of the autonomic nervous system and hypothalamus are surveyed. All these factors are related in a conception of homeostatic regulation. The importance of heredity is pointed out.

The later chapters deal with clinical aspects, classification and treatment. One is impressed throughout by the lack of well-established, exact knowledge of any but the most superficial aspects of the problem, and by the difficulty of devising experimental approaches yielding unambiguous conclusions. This study, however, is a challenge and a stimulus for continued work in this field.

The book is lucidly written, but the usage of conjunctions and prepositions is frequently inept. The typography is poor. There is a bibliography at the end of each chapter, and a good index.

Malaria and Colonization in the Carolina Low Country 1526-1696 By St Julien Ravenel Childs 8°, paper 306 pp. Baltimore The Johns Hopkins Press, 1940 \$2.50

The Carolina Low Country extends from Florida to Cape Hatteras, from the coastal area as far west as the mountains. Malaria was formerly so prevalent in this territory that white men could remain there overnight during the fever season only at the risk of their lives. Before 1670, when the Englishmen settled near the present site of Charleston, all the earlier colonies had failed. Malaria was partly responsible, since it occurred in epidemics and often caused marked disability and even death. Later

the disease became endemic, until it gradually died out toward 1700.

Mr Childs has written a finely documented account of the whole subject. His work is full of dependable historical data of medical interest. He gives an excellent account of Dr Nicolás Monardes, of Seville, a voluminous writer, who gave the only definite report of malaria in the Low Country during the period of 1565-1580. His work is best known in this country through its English translation, *Joyfull Newes out of the Newe Founde Worlde* (1577), by Frampton. The first edition, in Spanish, was published at Seville in 1565. A new edition of Monardes was published in 1925.

About one hundred years after Monardes's time, another physician, the Englishman, John Locke, was an important figure in the development of the Carolina colony. He entered the services of Astley Cooper, first earl of Shaftesbury, as a physician. He probably drew up the constitution of Carolina and assisted the promoters in other ways. Neither Cooper nor Locke came to Carolina, and there were few physicians in the Low Country in the early seventeenth century. Toward 1700 many more doctors are listed by Mr Childs in his extensive account of the development of Charleston.

This comprehensive study, with an extensive bibliography and a good index, is a fine example of medical and historical research. It will long serve as the outstanding reference on the subject.

Medical Work of the Knights Hospitallers of Saint John of Jerusalem By Edgar Erskine Hume, M.D. 4°, cloth, 371 pp., with 130 illustrations. Baltimore Johns Hopkins Press, 1940 \$3.00

Although there have been a number of histories of the Knights of Saint John of Jerusalem, no account of the medical work of this old order has ever before been undertaken. The book is therefore a work of primary importance to the medical historian. No one is more fitted for the investigation than Colonel Hume, a Knight of Honor of the order, an accomplished historian, and a physician in the Medical Corps of the United States Army. The book, moreover, has the stamp of the Institute of the History of Medicine of the Johns Hopkins University, and some of the chapters have already appeared in the *Bulletin* of that institute.

Colonel Hume's interest in the order is understandable, for the Knights of Saint John, later called the Knights of Rhodes and the Knights of Malta to signify their travels, were first organized by military medical officers or war-ringing physicians. They were not noncombatants, but a military group who could strike the enemy mighty blows, and yet later bind the wounds of that same enemy as well as those of their own comrades. They went on the Crusades, founded a hospital in Jerusalem as early as 1065, were driven to Rhodes and later to Malta, and finally spread over the world, always taking a Christian part in wars and doing missionary work in distant lands. The British branch was active in World War I, and many will remember the bombing of their hospital at Etaples in 1918.

The book is well produced, with numerous illustrations and an index. It is a fundamental text, and Colonel Hume is to be congratulated on completing a long task. He has traveled far, and much of the medical history of this order is due to his first-hand observation. This is the type of work of which American medical historians can justly be proud.

Pediatrics and Pediatric Nursing. By A. Graeme Mitchell, M.D., Echo K. Upham, R.N., and Elgie M. Wallinger, R.N. 8°, cloth, 575 pp., with 83 illustrations. Philadelphia: W. B. Saunders Company, 1939. \$3.00.

This book satisfactorily covers the ground of pediatric nursing in health as well as in disease. It should teach the nurse not only what to do and how to do it, but the why's and wherefore's of her procedures. In other words, it supplies adequately the pediatric background, without giving her so much material as to tempt her to become an amateur doctor. The writing is plain, simple and direct; explanations and definitions are given where they seem necessary. There are excellent charts and tables, apt and pertinent illustrations, diet lists and diet instructions for different ages and lists of suitable books and toys. Because the book is intended largely for use in training schools, there are problems and questions at the end of every chapter. It is a pleasure to recommend a book that seems so safe, sane and adequate within its field.

Clinical Roentgenology of the Alimentary Tract. By Jacob Buckstein, M.D. 8°, cloth, 652 pp., with 525 illustrations. Philadelphia: W. B. Saunders Company, 1940. \$10.00.

The author has written a most readable text, profusely and excellently illustrated, and containing abundant references to the literature. Unlike many so-called "new" books, the diagnostic criteria applicable to even very recently described technical maneuvers are incorporated. It should be read by all roentgenologists and gastroenterologists. The general practitioner who peruses it will be impressed by the multiplicity of lesions successfully diagnosed by the roentgen method and will receive tangible proof that roentgen diagnosis of disease of the gastrointestinal tract is no longer the simple procedure it was once thought to be, but rather a complex operation requiring special equipment, repeated examinations and specific knowledge on the part of the examiner.

Endocrine Therapy in General Practice. By Elmer L. Sevringhaus, M.D. 8°, cloth, 239 pp., with 49 illustrations. Chicago: The Year Book Publishers, Incorporated. \$2.75.

This small handbook on clinical endocrinology is a welcome addition to the busy physician. The book is clearly written. There is an apparent omission of many scientific details that might have made it difficult to read; however, the chief endocrine disorders are covered clearly so that an understanding of the subject can be accomplished with a minimum of effort. At the same time, the author has made each chapter sufficiently thorough for the complexities of each endocrine problem to be appreciated. The newer knowledge of Addison's disease is included: in every way the book is thoroughly up to date.

The Bacteriology of Public Health. By George M. Cameron, Ph.D. 8°, cloth, 451 pp., with 35 illustrations and 8 color plates. St. Louis: C. V. Mosby Company, 1940. \$3.50.

This is a text of general medical and laboratory knowledge, for the most part accurate, but medically superficial. It is well written, and in places is well documented. It is doubtful if the author could pass the type of bacteriology examination customarily given to second-year medical students in this country. This lack of clinical perspective, as well as of precise knowledge, makes the book useless for medical students, and also for anyone who intends to undertake public-health responsibilities. It may be of value as a college textbook.

Cyclopropane Anesthesia. By Benjamin Howard Robbins, M.D. 8°, cloth, 175 pp., with 40 illustrations and 46 tables. Baltimore: Williams & Wilkins Company, 1940. \$3.00.

This short informative book on Cyclopropane Anesthesia is written by a leading laboratory investigator in the field. The text gives many tables and laboratory findings, with the conclusions drawn from them. These are related to the opinions and findings of clinicians of wide experience. There are chapters dealing with the concentrations of cyclopropane required for anesthesia and with the effect of cyclopropane on the respiratory system, the gastrointestinal tract, the blood and the tissues. Other chapters describe the administration of cyclopropane and discuss its indications, contraindications and complications. In the outstanding chapter—on the effects of this anesthesia on the circulatory system—the author reports his experiments, which show that, in dogs, morphine increases the frequency of cardiac arrhythmias during cyclopropane anesthesia and that certain barbiturates abolish them. It is a valuable and instructive reference work for the specialist in anesthesia.

A Man Who Found a Country. By Dr. A. Nakashian. 8°, cloth, 279 pp. New York: Thomas Y. Crowell Company, 1940. \$2.75.

This pleasantly written and informative book will interest readers who desire to get a first-hand knowledge of the life and work of a Christian subject and physician living under the rule of a Moslem monarch. Dr. Nakashian, an Armenian who obtained his medical degree in 1894, records his unique and dramatic experiences in reaching that goal. The theft of a corpse, sessions with a mad professor, efforts to undermine the strange superstition that examination of the pulse reveals everything, encounters with highway robbers, life in prison and incidents in general practice—all give an illuminating picture of conditions in general in the Near East. Dr. Nakashian writes in an exhilarating style, and the reviewer believes that this book will supply several hours of relaxation and instruction to any physician who may read it.

Handbook of Microscopic Characteristics of Tissues and Organs. By Karl A. Stiles, M.S., Ph.D. 8°, leather, 148 pp., with 9 tabular charts. Philadelphia: Blakiston Company, 1940. \$1.50.

This outline is intended as a supplementary textbook of histology. A major feature is the help it offers to beginners in studying the identification of tissues and organs. Pages are printed only on one side, providing in this manner the opportunity for writing additional laboratory or lecture notes. There are useful tabular charts on the various systems of the body. This is a good guide for students who are preparing for examinations.

Psychiatry for Nurses. By Louis J. Karnosh, B.S., Sc.D., M.D. and Edith B. Gage, R.N. 8°, cloth, 327 pp., with 34 illustrations. St. Louis: The C. V. Mosby Company, 1940. \$2.75.

This is a well-organized and practical book, worth reading even by the person who is not a nurse. It will do very well for the use of social workers and intelligent laymen who want to know facts and not fancies about mental disease.

The style is direct, terse and informative. The authors have done a good job in the preparation of this book, which can be highly recommended.

The New England Journal of Medicine

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VOLUME 224

JANUARY 23, 1941

NUMBER 4

HEAD INJURIES*

Observations Based on a Study of 554 Patients

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If thou examinest a man having a gaping wound in his head penetrating to the bone and smashing his skull thou shouldst palpate his wound. Shouldst thou find that smash which is in his skull deep and sunken under thy fingers, while the swelling which is over it protrudes, he discharges blood from both his nostrils and both his ears and he suffers with stiffness in his neck, so that he is unable to look at his two shoulders and his breast.

Thou shouldst say regarding him: One having a gaping wound in his head, penetrating to the bone and smashing his skull, while he suffers with stiffness in his neck.

An ailment not to be treated

Thou shalt not bind him but moor him to his mooring stakes, until the period of his injury passes by.¹

THUS wrote a wise and observant Egyptian physician, possibly Imhotep himself, in the earliest known surgical record, well over four thousand years ago. The interest in this striking type of injury has continued through all the years down to the present time. I am accordingly presenting some observations as to treatment based on a study of 554 patients in the Rhode Island Hospital during the past five and a half years.

So far as I can determine, a Rhode Island physician, Henry E. Turner, of Newport, was probably the first to suggest the deliberate opening of the dura in order that the pressure accompanying these injuries might thereby be relieved. In a paper presented to the Rhode Island Medical Society in December, 1861, he² reported two severe head injuries: the first to his brother, who had wide laceration of dura and brain, and recovered; the second to a seaman, who had a depressed fracture without injury of the dura, and died. He questioned 'whether the penetration of the dura mater did not, in my brother's case,

relieve the brain from the pressure, which, in the other case, proved fatal.' In the following year, he³ wrote

I have been thus particular in giving an account of this case, as it furnishes a pretty good commentary on the doctrine I ventured with some hesitation, to enunciate a year ago that, in severe injuries of the head perforation of the dura mater improves the prospect of relief and final recovery. I should not feel justified in opening the dura under such circumstances, but I think the question of its propriety worthy of investigation and discussion.

About thirty five years later, Horsley⁴ did have the courage to open the dura deliberately to relieve intracranial pressure, and still later Cushing⁵ worked out the technical details that have made subtemporal and suboccipital decompressions such valuable aids in treating diseases within the head.

At the Rhode Island Hospital, patients with head injuries are admitted to the Surgical Service. Such cases comprise a mixed group. Forty four per cent are due to automobile accidents, 36 per cent to falls, 11 per cent to blows on the head and the rest to various causes, with industrial accidents accounting for less than 2 per cent. These patients are always seen in consultation by the Neurological Service and the Eye Service, and by other services as needed. The treatment that we now follow has thus grown gradually as a result of close co-operation between these departments.

Treatment of head injuries is primarily the treatment of brain damage. Complications such as fracture, hemorrhage and infection may arise and may mask or completely outshadow the injury to the brain, but it is essential that we hold to the general conception of brain damage. This damage, of course, varies within wide limits, and it is convenient to divide it clinically into three syndromes: those of concussion, congestion and contusion. These degrees of damage merge into one another—there is no sharp line of demarcation.

*Presented at the annual meeting of the New England Surgical Society, Poland Spring, Maine, September 27, 1940.

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Following an injury of the head, the patient with concussion has a loss of consciousness from which he recovers completely. All other findings are normal, there are no neurologic signs, and the evidence given by lumbar puncture is completely negative. Patients with this syndrome have made up 4 per cent of our series.

The patient with congestion has, in addition to his concussion, headache, nausea, vomiting, dizziness, confusion and possibly loss of memory. Lumbar puncture shows elevation of pressure, but the fluid itself is normal. Forty-seven per cent of our patients were classified as in this group.

Contusion is considered to be present when there are added to the signs of congestion evidences of more serious brain damage. There may be coma with loss of sphincter control, respiratory distress, delirium, convulsions and shifting localizations of all sorts. Many of these patients are in shock. Lumbar puncture shows bloody fluid, usually under increased pressure, although this may be lowered by the presence of shock or dehydration. Forty-nine per cent of our patients were thought to have some degree of contusion.

Our aim in treatment is to get the patient at rest with a normal intracranial pressure as soon as this can be done safely. If he is in shock, this must be remedied first of all. Blankets and heaters are used to conserve body warmth, black coffee is given by rectum, and caffeine sodium benzoate is given subcutaneously. The two latter agents serve a double purpose: they not only act as general stimulants but help to control pressure within the head. Handling of the patient is limited as strictly as possible. If clothing is to be removed, this is done gently under blankets. No attempt is made to do a thorough examination or a lumbar puncture or to take x-ray photographs. Lacerations are covered with sterile dressings and their repair left until later, unless hemorrhage has to be checked. And so, with the patient suffering from head injury and shock, we follow the advice of the early surgeon and "moor him to his mooring stakes, until the period of his injury passes by."

When the period of shock has passed, we can begin to make a careful estimate of the extent of the damage to the brain. In addition to the usual clinical chart, an hourly record of pulse and blood pressure is kept, and the fluid intake and output are recorded. A thorough physical examination is made, and lacerations of the scalp are explored with the gloved finger for fracture or depression. A complete examination is made by a neurologist, and the eyes and eyegrounds are examined by an ophthalmologist. Lumbar puncture is next done under complete aseptic precautions,

a water manometer being used to record the pressure. Care should be taken to see that the patient's head is not too sharply flexed, since failure to observe this precaution may result in jugular compression, which will raise the intracranial pressure. This will not only give false information but will aggravate the condition for which relief is sought. If the pressure is moderately increased, it is our practice to remove enough fluid to bring it down to a normal level; if it is grossly increased, we bring it about halfway to normal at the first puncture, using further punctures to bring it more gradually to a normal reading. We think that this precaution is of value in avoiding possible further damage from a too-sudden shift in pressure. The frequency with which punctures are done depends on the amount of pressure, the presence or absence of blood and the response to the taps. We have punctured as often as once in six hours when this has seemed necessary. In any case, our aim is to record clear fluid, with cell count, protein and pressure normal at the final puncture. A careful cell count is important, because many fluids reported grossly clear show an appreciable number of red cells when these are counted. If we suspect that a patient has an extradural hemorrhage, we do not use lumbar punctures until after the bleeding has been controlled, since an earlier reduction of pressure may increase the hemorrhage. If the patient has drainage of spinal fluid from the ear, nose or pharynx we are reluctant to use punctures until this stops, because reduction of pressure may result in a reverse flow with a greater possibility of infection. We also believe that the leakage itself helps in reducing the pressure.

As aids in the control of pressure we use careful and moderate dehydration by limitation of fluids, intravenous concentrated glucose solutions and intramuscular magnesium sulfate, bearing in mind that overenthusiasm in the use of any of these methods may bring about a toxic dehydration, and that renal damage may be caused or aggravated by hypertonic solutions. If a combination of all these methods fails to reduce the pressure, subtemporal decompression may be performed; but its results, except when subdural hematoma is present, are disappointing. We think that this method is rarely needed.

Drugs are used sparingly in brain damage. Morphine is not used at all, since it has a real effect in increasing intracranial pressure and depressing respiration. For persistent headache we employ acetylsalicylic acid in combination with caffeine; for moderate sedation, pentobarbital-sodium; and for active delirium, sodium pheno-

barbital intramuscularly or paraldehyde by rectum.

Thus far we have considered the problem of brain damage and its treatment, by far the most important consideration in head injuries. But there are, of course, complications. Fracture of the skull was demonstrated in a little over 25 per cent of the patients in this series; the actual incidence must be considerably greater, since all fractures are not shown by x-ray, and all patients, for one reason or another, are not examined by x-ray. The presence or absence of fracture, except of special types, is usually considered to be of little moment. It is interesting to note that the mortality of patients with fracture was 9 per cent, considerably higher than the mortality for the entire series, which was a little under 5 per cent. Linear fractures of the vault showed a mortality of less than 4 per cent, whereas those of the base showed a mortality of 37 per cent. These fractures call for no treatment other than that of the associated brain damage. Fractures extending into the nasal accessory sinuses are potentially more serious because of the possibility of infection; we had 3 such fractures, but no deaths from this cause. Fractures involving the mastoid carry the same risk; we had 7 such fractures, 3 of them requiring operations on the mastoid, with 1 death. Recently developed drugs are of great value in treating infection coming from this cause, we have had a patient with severe meningitis recover completely following the use of sulfapyridine.

Depressed fractures need operative treatment. When they are compound, their presence can often be made out by the palpation previously advised, and operation is undertaken as soon as shock and brain damage will permit. Thorough débridement and generous flushing of the wound with warm saline solution are of great help in reducing infection. In children the depressed area can often be snapped back into position by means of an elevator introduced through a small drill hole. In older people, the depressed fragments are not infrequently locked. In some cases we have found it possible to free this locking by making a drill hole at the point where the lines of fracture come together; in others, we have gained this end by widening the lines of fracture by the use of DeVilbiss forceps. Free bone fragments are removed, and the resulting bone defect is left for possible later plastic repair. The wound in the scalp is closed without drainage.

Simple depressed fractures can be left for elevation until the patient is in good general condition. Their diagnosis is more difficult, but careful tangential x-ray films are of great help. In our experience, the degree of depression found at

operation is almost always greater than the x-ray films indicate. The mortality in simple depressed fractures depends on the underlying brain damage; in our patients with compound depressions it has been 25 per cent.

When a patient after initial unconsciousness clears for a period and then lapses again into unconsciousness, he presents the classic picture of extradural hemorrhage. This is usually due to rupture of the middle meningeal artery or of a venous sinus, and calls for immediate operation. After determination of the side involved, a subtemporal decompression is performed, the clot is removed and the bleeding artery clipped or tied with silk. If this is not possible, the foramen spinosum can be plugged with wood or cotton and the artery thus obliterated. Sinus bleeding can usually be controlled by a muscle patch. If extradural bleeding is the chief injury, the results of the operation are very good, but there is often associated severe brain damage. Our mortality has been 50 per cent.

The existence of a subdural hematoma should be suspected when a patient with head injury not of the overwhelming type fails to improve under the treatment already described, and it is chiefly to the work of Munro⁶ that we owe our knowledge of this complication. The diagnosis can be established only by temporal trephine, bilateral if needed. Observation of the dura through such an opening is not enough, the dura is opened and the hematoma is treated by the methods that he has described so well. The mortality of this complication is influenced to a considerable degree by the severity of the brain damage, in our patients it has been 22 per cent.

SUMMARY

Observations are presented on the treatment of head injuries based on the results of a conservative method followed at the Rhode Island Hospital in caring for 554 patients during the last five and a half years, with an operative incidence of 6 per cent, an operative mortality of 29 per cent and a gross mortality of slightly under 5 per cent. 184 Waterman Street

REFERENCES

1. Breasted J H. *The Edwin Smith Surgical Papyrus. Published in facsimile and hieroglyphic transcription with translation and commentary in two volumes.* Vol. 1. 536 pp. Chicago: University of Chicago Press, 1930. Pp. 158, 159, 161.
2. Turner H E. Report on surgery. *Communications Rhode Island M Soc.* 1:185-195, 1877.
3. *Idem.* Surgical cases. *Communications Rhode Island M Soc.* 1:197-199, 1877.
4. Horsley V. On the technique of operations on the central nervous system. *Brit M J* 2:411-423, 1906.
5. Cushing H. The establishment of cerebral hernia as a decompressive measure for inaccessibly brain tumors with the description of intermuscular methods of making the bone defect in temporal and occipital regions. *Surg Gynec & Obst* 1:297-314, 1905.
6. Munro D. *Cranio Cerebral Injuries. Their diagnosis and treatment.* 412 pp. New York: Oxford University Press, 1938.

DISCUSSION

DR. DONALD MUNRO (Boston): It is gratifying that somebody who has not shown the bad judgment to pin the tag "specialist" on himself has taken up the study of these very common conditions, which, after all, ought to be handled almost exclusively by the general surgeon. I congratulate Dr. Pickles on his mortality figures, and I congratulate you who are here on having had the opportunity to hear such a brilliant and satisfactory presentation.

I am in complete agreement with him except for two points. The first is his additional use of dehydration in the treatment of brain injury. I believe that the use of dehydration in the treatment of brain injury should be limited to the very first part of the treatment, perhaps not extended beyond the first forty-eight hours after the injury; after that the use of dehydration does more harm than good. I am convinced by my experience that the limitation of fluids by mouth, or by any other way, is a mistake, and I have for some years made it a rule that the minimum amount of fluid that an adult patient with a head injury gets is 5000 cc. every twenty-four hours. I believe that less than that is not adequate to care for the fluid needs of such patients.

The second point on which I am in disagreement with him is about irrigation of the wounds in the treatment of compound fractures. I think that the irrigation of wounds in compound fractures of the skull is contraindicated; I never use it. That, however, brings me to a debatable part of the treatment of head injuries, a part that many of the specialists are in disagreement about, and one in which I have very definite and fixed ideas, that is, the problem of when and how to operate on compound fractures of the skull. There is a rather general opinion that compound fractures of the skull are emergencies. My experience and opinion are that they are not emergencies, if you mean by an emergency that the patient must be operated on as soon as seen. I feel very strongly that these patients practically never need to be operated on until such time as you can make your operation an elective procedure. In that event, you have forty-eight hours from the time they are injured until the time they must be operated on.

In support of that viewpoint I invite your attention to the fact that the problem of compound fractures of the skull deals not only with the mortality but also with the morbidity from sepsis after the fractures have been treated. In relation to this I have been using in my clinic the same technic for the last ten years. Everyone who works on compound fractures of the skull in my clinic does every case the same way.

This treatment is always carried out by doing a complete débridement with no local treatment previous to that except for the putting of a dry dressing on the wound. The débridement is done in such a way as to produce an expected healing of the wound by first intention. Unless it does so heal, we class it as septic, even if it merely contains a granulating area. Exception to that is made with cases with frontal-sinus involvement in which the supra-

orbital ridge has been involved. In such cases the wound is drained.

I have had a total of 176 cases of compound fractures of the skull, 13 of them from bullet wounds and 25 with involvement of the frontal sinus or cribiform plate. Some of these cases have died within twenty-four hours, mostly of surgical shock. In a study of mortality figures, one must consider the incidence of twenty-four-hour deaths, which in this series was 15 per cent. The total mortality for the whole 176 cases was 28 per cent. If we exclude the twenty-four-hour deaths, it was 13 per cent.

One hundred and thirty, or 74 per cent, of these 176 cases were operated on, with a mortality of 15 per cent. A study of the operated cases and the cause of death in relation to the correctness of the technic in operating on them has demonstrated that all but 6 per cent of the deaths were due, or could be traced directly, to faulty technic in the treatment of the wound. I believe that the operative mortality in compound fracture of the skull should not rise above 10 per cent, and may well be brought lower than that.

Thirty-two, or 25 per cent, of the 130 operated cases were septic. By that I mean that the wounds granulated and healed by second intention or that abscesses, osteomyelitis or meningitis developed. If the cases which were septic because of technical errors are excluded, the percentage of sepsis drops to 5 per cent. I think that is probably somewhere near the irreducible minimum that is bound to accompany any method of treating compound fractures of the skull.

These figures are significant because they represent a unified experience with a considerable group, and serve to annotate Dr. Pickles's excellent paper.

DR. EDWARD H. RISLEY (Waterville, Maine): I should like to get an expression of opinion as to the danger or lack of it in doing lumbar punctures in cases which are bleeding. This seems to be an open question.

DR. PICKLES (closing): On the question of dehydration, I apparently did not make myself clear. We attempt it only when other methods fail; that is, when repeated lumbar punctures and ordinary care fail to hold down pressure, we limit fluids and use intravenous glucose and magnesium sulfate. If we use these agents to dehydrate, it seems illogical to push in fluids by mouth at the same time. We do not use dehydration unless we are pushed to that point.

As to the irrigation of wounds, I am afraid that I shall have to differ with Dr. Munro, although his experience is much greater than mine. I have found it a most useful means of converting a dirty, potentially septic wound into one, which can be closed by complete suture and which will heal by first intention.

As regards the use of lumbar puncture when the patient is bleeding, its restriction applies only when we believe that there is a definite extradural hemorrhage; although this may be a theoretical consideration, we still think that it is not necessary, that it does not do any particular good because one is going to operate anyway, and that it may do harm.

ENTEROBIASIS: ITS INCIDENCE AND SYMPTOMATOLOGY
IN A GROUP OF 505 CHILDREN*

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THE development of a simple and accurate method for the diagnosis of pinworm infection has made possible valuable additions to our knowledge of the distribution of the parasite, *Enterobius vermicularis*. Accumulating evidence shows that *E. vermicularis* is one of the commonest parasites in human beings in the United States. However, no survey has yet been made to determine its incidence in the New England area, and comparatively little is known about the symptomatology of enterobiasis. This paper presents the results of a study of the incidence and symptomatology of enterobiasis as encountered in a group of 505 children.

METHODS

The study of the incidence was made on a group of 505 white patients from two to twelve years of age at the Children's Hospital in Boston. These children were divided into two groups: 118 patients studied on the medical wards, and 387 patients examined in the Medical Outpatient Department. Consecutive patients were examined without selection as to age, sex, or type of illness. Information was obtained regarding the age and sex of each child and the number of persons in his family, the latter being divided into those under fourteen years and those fourteen or over.

Determination of the presence of pinworm infection was made by using the cellophane tipped anal swab devised by Hull,¹ generally known as the "NIH swab." This swab consists of a small glass rod, over one end of which a one inch square of cellophane is folded and held in place with a rubber band. For convenience, a one-holed rubber stopper is placed on the other end of the rod, and the swab is thus fitted into a small test tube that serves as a container. In taking the swab the cellophane tipped end is swept over the perianal skin, with the swab held parallel to the skin to take advantage of the scraping properties of the folded edges of the cellophane. In preparing the swab for examination a drop of N/10 sodium hydroxide is placed on a glass slide, the cellophane tipped end of the swab

is placed in the drop, and the rubber band is pushed up with a pair of forceps, thus releasing the cellophane, which is then flattened on the slide. A cover slip is applied to complete the mount. Microscopical examination will detect the ova among the epithelial debris. Since the female pinworm lays its eggs on the perianal skin, this is the obvious site from which to recover eggs for diagnostic purposes. The NIH swab appears to be a highly efficient and accurate means of carrying out such a procedure. Sawitz et al.² found that it was four times as effective as the methods using stool examinations, Faust et al.³ found it five times as efficient as any other means of diagnosis.

Our swabs were taken between 9:00 a.m. and 5:30 p.m. and examined on the same day. In no case were they taken before the morning toilet—a fact that must be considered in evaluating the results. In 90 unselected cases a second examination was done after an interval of two to seven days. The debris adhering to the cellophane was systematically surveyed, using a magnification of 100, when objects resembling ova were seen, the identification was checked with a magnification of 450. No difficulty was encountered in distinguishing the ova, although ova like artefacts in the cellophane, such as those described by Reedon,⁴ were occasionally seen.

The study of the symptomatology was made on 387 patients seen in the Medical Outpatient Department. Consecutive admissions were surveyed to avoid selection. An arbitrary list of eleven of the signs and symptoms most frequently ascribed to pinworm infection was selected for study. A brief history of the symptoms was taken from the adult accompanying the child. Because none of the patients who came to the hospital complained primarily of pinworm infection, an attempt was made to evaluate the history and to disregard those symptoms for which the primary illness provided an adequate explanation. Information was obtained regarding the past and present history of pinworm infection, after which the perianal region was examined for cutaneous lesions and an NIH swab was taken.

In a group of children who were patients on the medical wards, the blood studies done as a part of the routine medical examination were reviewed to see if there was an eosinophilia. This group

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was composed of 28 swab-positive and 96 swab-negative children.

RESULTS

Incidence

In the group of 505 children examined, 97 (19 per cent) were found to have enterobiasis. The age and sex distribution of these cases is summarized in Table 1. The relation between the

TABLE 1. *Distribution of Enterobiasis by Sex and Age.*

	2-4 YEARS OLD			5-9 YEARS OLD			10-12 YEARS OLD		
	NO OF CASES	NO POSITIVE	PER CENT POSITIVE	NO OF CASES	NO POSITIVE	PER CENT POSITIVE	NO OF CASES	NO POSITIVE	PER CENT POSITIVE
Boys	92	8	9	113	24	21	43	6	14
Girls	78	14	18	128	32	25	51	13	26
Totals	170	22	13	241	56	23	94	19	20

number of children in the family and the incidence of infection is shown in Table 2. An analysis of the data showed that the average number of children under fourteen years of age in the

TABLE 2. *Correlation between the Number of Children in the Family and the Incidence of Enterobiasis.**

NO OF CHILDREN UNDER 14 YEARS IN FAMILY	NO OF CASES	NO OF POSITIVE CASES	PER CENT POSITIVE
1	145	13	9
2	159	24	15
3	101	23	23
4	48	18	38
5	19	8	42
6	7	2	29
7	4	1	25
8	3	1	33
9	1	1	100

*Based on a study of 487 children, of whom 91 showed ova.

families of the 91 positive cases was 3.1; in the 396 negative cases the average number was 2.2. Additional data showed that for 91 positive cases the average total family size was 5.5 persons, and for 394 negative children 4.6 persons.

In a group of 387 children, 42 (11 per cent) gave a history of previous pinworm infection, and of these 16 (38 per cent) proved to be positive on swab examination. In the 345 children with no history of infection, 56 (16 per cent) were positive. With a different form of analysis it was found that in the 72 cases that were positive on swab examination, 56 patients (78 per cent) gave no history of pinworm infection.

Only a small group of children were examined a second time. Thus, of the total series of 505 children, 415 were examined by one swab, of which 74 (18 per cent) were positive; of 90 children examined by taking two swabs, 23 (26 per cent) were positive.

Symptomatology

The study of the symptoms was made on 387 children, 72 (19 per cent) of whom had pinworms, and 315 (81 per cent) of whom were swab-negative. The data on the symptomatology were analyzed in two ways: first, by comparison of the symptoms presented by the positive and swab-negative children (these results are summarized in Table 3 and are discussed below); secondly, the

TABLE 3. *Comparison of Symptoms in the Swab-Negative and Swab-Positive Groups.**

	SWAB NEGATIVE CHILDREN		SWAB POSITIVE CHILDREN	
	NO OF CASES	PER CENT	NO OF CASES	PER CENT
Gastrointestinal symptoms				
Present				
Nausea and vomiting.	56	18	9	13
Vague intestinal pain.	77	24	13	18
Diarrhea	4	1	0	0
Weight loss	12	4	2	3
Loss of appetite	67	21	18	25
Absent	175	56	46	64
Perineal symptoms				
Present				
Anal pruritus	40	13	12	17
Anal skin lesions	6	2	4	6
Vaginitis and vulvitis	8	3	2	3
Absent	271	86	58	80
Nervous symptoms				
Present				
Night restlessness	94	30	21	29
Enuresis	40	13	12	17
Masturbation	3	1	3	4
Absent	203	64	42	58
No gastrointestinal, nervous, or perineal symptoms	118	38	26	36

*Based on a study of 387 children, of whom 72 showed ova.

possibility of a correlation between the sex of the patient and the symptomatology was considered in a group of 190 boys, of whom 29 were positive, and 197 girls, of whom 43 had pinworms. This study showed no significant sex variation.

In regard to the relation between the time of day and the intensity of symptoms, 4 of the 315 swab-negative and 3 of the 72 swab-positive patients reported a nocturnal increase in intensity. None of the children gave a history of diurnal increase in symptom intensity. The blood picture was reviewed in 124 patients, 28 of whom had enterobiasis. None of the positive cases showed an eosinophilia of more than 5 per cent.

DISCUSSION

Incidence

Comparatively few reports on the incidence of enterobiasis have appeared in the literature. However, the limited evidence now at hand indicates

that the infection is commoner than has been suspected. The results of the surveys on children in which the NIH swab has been used are summarized in Table 4. Of these, the studies of

TABLE 4. *Studies on the Incidence of Enterobiasis in Children in the United States.*

AUTHORITY	NO. OF CASES	PER CENT POSITIVE	METHOD*	GROUP
Bozicevich ³	230	31	Single swab	Boys' camp
Cram et al. ⁶	524	36	Multiple swab	General population
Bozicevich and Brady ⁷	504	57	Multiple swab	Boys' camp
Cram and Nolan ¹⁰	106	55	Multiple swab	Nursery school
Switz et al. ²	131	96	Multiple swab	Charitable institution

*The NIH swab was used in all the studies.

Bozicevich,³ Cram et al.⁶ and Bozicevich and Brady⁷ were carried out on patients who were not exposed to the constant opportunities for contact infection that might occur in an orphanage or boarding school; therefore, in this respect their results are comparable to those of the present study. However, in other respects these studies are not comparable with ours, for there are two factors that have probably resulted in our obtaining an infection rate that is misleadingly low. In the first place, the majority of the children were examined by means of only one swab. Cram and Reardon⁶ state that at least one swab should be taken on each of four days before negative findings can be considered to represent a probable absence of pinworm infection. Bozicevich and Brady,⁷ using this system, found that the first swab detected 68 per cent of the positive cases. In the first place, the majority of the children were the incidence from 18 per cent to 26 per cent. The second factor is that the swabs were not taken at the optimum time for the recovery of pinworm ova, since the examinations were made after the morning toilet had been completed.

In the present series, 23 per cent of the girls were infected, as compared with 15 per cent of the boys. Analysis of these figures shows that this difference is 2.2 times the value of the standard error of the difference of these proportions and is statistically significant. This finding is at variance with that of Cram et al.,⁶ who found a slightly higher incidence in males. In comparing age and incidence of infection it was found that enterobiasis was less common in the younger children: 13 per cent of those of two to four years, 23 per cent of those of five to nine and 20 per cent of those of ten to twelve were infected. A statistically significant variation could be established be-

tween the two-to-four-year and five-to-nine-year groups, the difference between the proportions being 2.8 times the value of the standard error of the difference. This observation is in accord with the findings of Cram et al.,⁶ who noted that the incidence was lower in the preschool group than in children of school age.

The familial nature of enterobiasis is well established, but unfortunately is often ignored when instituting specific therapy. Because of the multiple opportunities for infection and reinfection within the household group, it is to be expected that as the family size increases, thus enhancing the chances of acquiring an initial infection, there should be an increase in the incidence of enterobiasis. Bozicevich and Brady⁷ were able to demonstrate a correlation between family size and incidence of infection. In the present study, the average number of children in the households of the positive cases was found to be 0.9 greater than in the households of the negative cases. This difference between the means is 4.8 times the standard error of the difference, and indicates that the incidence is definitely related to the number of children in the family. A similar relation was found to exist when the total family size was considered.

Symptomatology

In the present series, the children with pinworms complained of gastrointestinal symptoms no more frequently than the uninfected children, with the exception of a slight but not significant variation in "loss of appetite." Likewise, vulvitis and night restlessness occurred with the same frequency in both groups. Anal pruritus, perianal skin lesions, enuresis and masturbation were slightly commoner in the positive group, but in no case was the variation statistically significant.

Brady and Wright⁹ presented the first statistical analysis of the symptomatology of this disease. They concluded that anorexia, night restlessness and insomnia were the significant symptoms, and found a slight but not statistically significant eosinophilia in the positive group. However, the group studied did not come from the general population but included "persons seeking treatment for known pinworm infestation" and "persons referred because of symptoms suggestive of oxyuriasis." Therefore, their findings are not comparable with those of the present study.

The relatively asymptomatic nature of the infection in the group of children examined in the present study is interesting. It would appear that subclinical enterobiasis is a common condition. Such a conclusion seems to be adequately substantiated by the fact that of the 72 positive cases, 64

per cent had no gastrointestinal symptoms, 80 per cent had no perineal symptoms, 58 per cent had no nervous symptoms and 36 per cent had none of the symptoms in these three groups. Very similar figures were obtained in the negative group.

These findings must not be construed as meaning that the pinworm is incapable of causing symptoms—in the present series 4 cases showed a symptom complex approximating that of the classic description of enterobiasis. However, it is quite probable that at least two factors have combined to overemphasize the importance of symptoms in this disease. In the first place, the symptoms tend to be misleading; they are for the most part so vague that a positive history could probably be elicited from a large percentage of the normal population. In the second place, in the past only those patients showing symptoms have been studied, for the diagnosis of enterobiasis was usually made after investigation of a suggestive train of symptoms. Further work is necessary to determine why some patients have symptoms and others do not. Perhaps factors such as the intensity of infection, the nervous constitution of the infected person and an allergic response to products of the parasite will be found important.

SUMMARY

In a series of 505 white children examined by the NIH swab technic, the incidence of enterobiasis was 19 per cent.

A significantly higher incidence of infection was found among the 257 girls, 23 per cent being positive, as compared with 15 per cent of 248 boys.

In the total series, the incidence in the two-to-four-year group (13 per cent) was significantly lower than that in the five-to-nine-year group (23 per cent).

A significant difference was found between the average number of children under fourteen years (3.1) in the families of the positive cases and that (2.2) in the families of the negative cases; there

was a similar difference in the total family size (5.5) of the positive cases and that (4.6) of the negative cases.

Seventy-eight per cent of the positive cases gave no history of previous pinworm infection.

The symptomatology of enterobiasis was studied in a group of 387 children, of whom 72 (19 per cent) had pinworms. Anal pruritus, anal skin lesions, enuresis, loss of appetite and masturbation were slightly commoner in children with pinworms; however, the difference between the incidence of these symptoms in children in whom ova were demonstrated and in those in whom none were found was not great enough to be statistically significant. Nausea and vomiting, vague intestinal pain, diarrhea, weight loss, vaginitis and night restlessness were not found more frequently in the swab-positive than in the swab-negative group.

These results indicate that a large proportion of the cases seen in this group were essentially asymptomatic, and that a condition that might be termed subclinical enterobiasis is relatively common.

REFERENCES

- 1 Hall, M. C. Studies on oxyuriasis. I. Types of anal swabs and scrapers, with a description of an improved type of swab. *Am. J. Trop. Med.* 17:445-453, 1937.
- 2 Switz, W., Odom, V. L. and Lincicome, D. R. The diagnosis of oxyuriasis: comparative efficiency of the NIH swab examination and stool examination by brine and zinc sulfate floatation for *Enterobius vermicularis* infection. *Pub. Health Rep.* 54:1148-1158, 1939.
- 3 Faust, E. C., Sawitz, W., Tobie, J., Peres, C. and Lincicome, D. R. Comparative efficiency of various techniques for the diagnosis of protozoa and helminths in feces. *J. Parasitol.* 25:241-262, 1939.
- 4 Reardon, L. Studies on oxyuriasis. X. Artifacts in "cellophane" simulating pinworm ova. *Am. J. Trop. Med.* 18:427-431, 1938.
- 5 Bozicevich, J. Studies on oxyuriasis. III. The incidence of pinworm infestation in a group of 230 boys in Washington, D. C. *M. Ann. District of Columbia* 6:239-241, 1937.
- 6 Cram, E. B., Jones, M. F., Reardon, L. and Nolan, M. O. Studies on oxyuriasis. VI. The incidence of oxyuriasis in 1272 persons in Washington, D. C. with notes on diagnosis. *Pub. Health Rep.* 52:1480-1504, 1937.
- 7 Bozicevich, J., and Brady, F. J. Studies on oxyuriasis. XV. A study of 504 boys in a boys' camp. *M. Ann. District of Columbia* 7:187-190, 1938.
- 8 Cram, E. B., and Reardon, L. Studies on oxyuriasis. XII. Epidemiological findings in Washington, D. C. *Am. J. Hyg.* 29:17-24, 1939.
- 9 Brady, F. J., and Wright, W. H. Studies on oxyuriasis. XVIII. The symptomatology of oxyuriasis as based on physical examinations and case histories on 200 patients. *Am. J. M. Sc.* 198:367-372, 1939.
- 10 Cram, E. B., and Nolan, M. O. Studies on oxyuriasis. XIX. Examinations of children in a private nursery school over an 18 month period. *Pub. Health Rep.* 54:567-574, 1939.

CONGENITAL ANOMALIES OF THE PELVIC ADNEXA

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CONGENITAL anomalies are caused by errors in development, and for that reason, any consideration of anomalous structures of the pelvic adnexa may well be prefaced by a brief review of the embryology involved.

In the embryo, the mesonephros is found along the posterior wall of the celom—the future peritoneal cavity. As it develops from its retroperitoneal position it pushes the peritoneum forward, thus forming the urogenital fold, which contains the precursor of the genital gland as well as the wolffian duct and the müllerian duct. The genital gland gradually separates itself by a longitudinal fissure, and after acquiring a mesentery, becomes the testis or ovary. In the female, the retrogression of the wolffian body and duct begins at the seventh or eighth week and continues until nothing but rests remain in the broad ligaments, constituting the parovarium. From the müllerian ducts, however, is developed the entire genital tract to the vaginal introitus. At first the ducts are solid cords; later they invaginate and acquire a lumen. Meanwhile they grow downward until they get below the crest of the ilium, when they turn sharply toward the midline and fuse, forming the utero-vaginal primordium.^{1,2} At the end of the fifth month, the fundus of the uterus normally rounds out, so that all appearance of the former double character of the uterine body disappears.³ The cranial ends of the müllerian ducts form the fallopian tubes, and the open ends develop a series of projections, the fimbriae. The middle and caudal thirds, which have fused, form the corpus of the uterus, the cervix and the upper two thirds of the vagina.

When the caudal ends of the apposed müllerian ducts fail to fuse, one sees, of course, all sorts of malformation, such as uterus didelphys, uterus arcuatus and uterus bicornis.⁴ Less often the cranial ends of the ducts fail to develop properly and other anomalies appear. Rudimentary tubes and ovaries are found,⁵ or the adnexa may be entirely absent.⁶⁻⁸ The tube may be a stub at the cornu of the uterus, whereas the ovary may be found anywhere in the pelvic cavity,⁹ posterior peritoneal wall, inguinal canal, labia majora¹⁰ or uterine wall.¹¹

Some interesting theories concerning the evolution of these malformations have been advanced by Masson and Kaump.⁴ Their excellent paper includes the following classification of the anomalies of the tubes, ovaries, uterus and vagina.

I. Simple reduplication

A. Incomplete joining of the müllerian ducts

1. Symmetrical false reduplication: uterus didelphys

B. Complete joining of the müllerian ducts

1. External junction, internal partition: uterus septus duplex

II. Rudimentary development

A. Aplasia

1. Incomplete development of both sides (symmetrical)

(a) Absence of tubes, uterus or vagina

2. Incomplete development of one side of uterus: uterus unicornis

B. Hypoplasia

1. Symmetrical or asymmetrical development with hypoplasia or one or more parts

III. Atresia of vagina, cervix or fundus of the uterus

The following case is illustrative of one type of pelvic anomaly.

CASE REPORT

E. E., a 21-year-old, married woman, presented herself in June, 1936, complaining of pain in the lower abdomen, especially on the left side, a sense of pressure on the rectum, dysmenorrhea and menorrhagia. In September, 1934, she had given birth to a premature infant weighing 4 pounds, 4 ounces, who was living and well. One year later she began to complain of pain throughout the lower abdomen, much more marked on the left side, and a sensation of pressure on the rectum. About this time dysmenorrhea developed, and the periods lasted longer than before (6 to 10 days), were more profuse and came oftener.

Physical examination revealed a well-developed and well-nourished young woman. The general examination was not remarkable; there was diffuse tenderness throughout the left side of the lower abdomen, and vaginal examination revealed a multiparous introitus with good support. The cervix had slight bilateral nicks but was otherwise not unusual to touch or sight; the os was closed. The uterus could not be made out clearly. The right vault was normal; in the left vault there was a mass which was spindle-shaped, movable and tender and thought to be either an ovarian cyst or a tubo-ovarian mass. A blood Hinton test was negative, as was a Schwartz-McNeil complement-fixation test.

Under treatment the symptoms were somewhat relieved, although the mass persisted. About one year later, in the spring of 1937, the patient returned complaining that the symptoms were more pronounced. Examination at this

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time was essentially the same as that previously recorded, with the spindle-shaped mass persisting apparently unchanged. At that time exploratory laparotomy was suggested.

At operation at the Newton Hospital in August, 1937, the abdomen was opened. Examination of the pelvis revealed a uterus unicornis, which was located in the left side of the pelvis and which, with the left broad ligament and the left tube and ovary, constituted the mass consistently felt on previous examinations. There was no broad or round ligament attached to the right side of the uterus. Above the pelvic brim near the right iliac fossa, partly covered by terminal ileum and cecum, was a rudimentary right tube and ovary; the latter, though smaller than normal, was apparently functioning normally, be-

days following operation; she had been relieved of the sensation of pressure on the rectum. Seven months later after the operation she returned with a complaint of amenorrhea since discharge, and examination revealed that she was 2 months pregnant, despite 7 months of amenorrhea. In October, 1938, she was delivered of a normal baby weighing 7 pounds, 1 ounce, by low forceps after an easy labor of 6 hours. The mother and baby are now well, although the uterus is slightly to the left of the midline.

It is extremely difficult to determine or even estimate the frequency of pelvic anomalies in women.^{4, 12-15} One thing is certain after review-

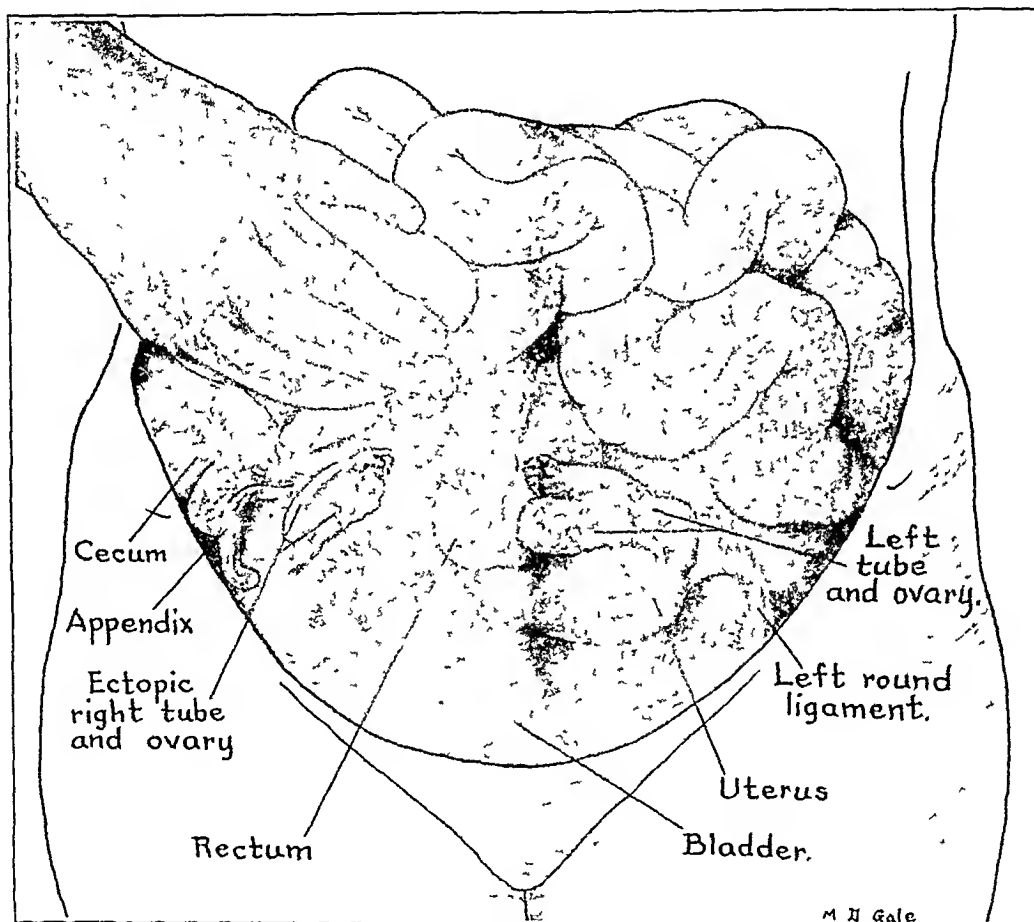


FIGURE 1.

cause there was a corpus hemorrhagicum present. These organs were attached to the posterior peritoneum by a stalk, but the fimbriated end of the rudimentary tube was facing the midline (Fig. 1). The appendix was removed as a routine procedure. To relieve the sensation of pressure on the rectum and the pain in the left lower abdomen, an attempt was made to suspend and straighten the uterus by placing two No. 2 chromic catgut sutures in the corner of the uterus where the right round ligament would ordinarily be situated and, after scarifying that area, by pulling it up to what was thought to be a fairly good position, against the anterior parietal peritoneum and slightly to the right of the midline. The ectopic right tube and ovary were not disturbed.

The patient had an uneventful convalescence, including a normal menstrual period, and left the hospital 16

ing some of the literature: there are few if any cases that are absolutely identical. The commonest types are those involving the uterus itself. Findley¹³ in his paper on uterus didelphys quotes other authorities who place the incidence of this abnormality at 1 in 740 women, of which only 3 in 19,000 are recognized clinically. Haynes¹⁴ reports 11 cases, Dannreuther,¹² 13. Masson and Kaump⁴ report a number of cases found at autopsy, but do not record how many protocols were examined. However, the congenital anomalies of the organs developing from the cranial end of the müllerian ducts or the genital glands are much less common, as has been previously

mentioned. Mayo and Knepper⁵ report 6 cases of congenital anomaly of tube and ovary (either or both) in twenty-seven years of experience. In two, rudimentary tubes were present; in the others, neither ovary nor homolateral tube could be found. White⁸ discovered 17 cases of anomaly of tube and ovary in the literature. Others^{6,7} report cases of congenital absence of tube and ovary, but Drosin⁹ and Mauro¹⁰ bring to light cases of ectopia of these organs. In the 2 cases reported by Mauro the ovary was found in the labium majus. Rudauv and Durante¹¹ describe a case in which only the histologic examination of the uterus uncovered an atrophic ovary and tube, buried in the uterine wall on the left side. These facts make one wonder whether every reported case of absence was authentic, or whether more extensive exploration would have uncovered these organs. All these writers stress the fact that abnormalities of the kidney and ureter on the affected side are not uncommon; but an intravenous pyelogram taken in the case reported above showed that both kidneys and ureters were present and normal. In an attempt to explain the anomaly herein reported on the basis of the embryology involved, I should say that the uterus unicornis was evolved entirely from the left müllerian duct. The right müllerian duct never succeeded in working its way caudad to join its partner, but its cranial end continued to develop, resulting in a rudimentary, ectopic right tube and ovary.

An analysis of the records at the Newton Hospital from 1923 to the present reveals that a diagnosis of double uterus was made in 2 cases, that of bicornuate uterus in 1 and that of absence of the fallopian tube in 1. In the latter case, to quote from the operator's note: "The fundus lay to the right of the pelvis. The right tube and ovary showed no abnormality. There was no left tube, and the left ovary was high on the left pelvic wall. A semblance of broad ligament extended from the ovary to the level of the internal os, where a very rudimentary round ligament could be made out. Nothing could be found which represented a rudimentary tube."

The records of the Boston City Hospital were reviewed from 1915 to the present with the following results: the diagnosis of double uterus was made in 9 cases; that of bicornuate uterus, in 7; that of septate (or double) vagina, in 5, and that of congenital anomaly of the tubes and ovaries, in 4. An analysis of the last 4 cases revealed the following: in one no pelvic organs were found (there was a vagina but no uterus, tubes or ovaries); the second had a congenital absence of the

left ovary and a rudimentary left tube; the third was the same as the second except that a nodule the size of a lima bean was excised from the left posterior peritoneal wall and the pathologist reported it to be a normally functioning ovary; the fourth had a congenital absence of the right appendages, a uterus unicornis and a pelvic right kidney. An attempt to estimate the frequency of these abnormalities from the above figures might lead to erroneous conclusions.

The chief points of practical interest are: Can diagnoses of pelvic anomalies be made in advance and if so, how? What is the proper treatment? Most women who have such anomalies lead a perfectly normal existence, except when the vagina is involved. The history alone is not very helpful; pelvic pain, menorrhagia, metrorrhagia, alone or in combination, are frequent complaints. Undoubtedly some abnormalities can be suspected and perhaps even diagnosed at the time of a pelvic examination, particularly the reduplicating forms. If an abnormality is suspected at this point, a hysterosalpingogram should be done, provided there is no contraindication to it. Despite all this, the type of abnormality here reported has practically always been discovered accidentally or incidentally. Absolute conclusions cannot be drawn from the literature. The weight of opinion leans toward the belief that some of these patients show less tendency to become pregnant than normal women do, but that once they have become pregnant, that difference is no longer present. The type of operation, then, that seems indicated is the most conservative surgery consistent with the relief of the symptoms. Each case must of necessity be judged on its own merits; and, by virtue of the very nature of the anomaly described, no standard technic can be advocated. The patient in this case was relieved of her distressing symptoms and also was able to procreate after, as well as before, operation.

SUMMARY

A case of congenital anomaly of the pelvic adnexa is reported.

A brief review of the embryology of the female genital system is presented.

The literature on this condition is reviewed.

The cases of congenital anomaly of the adnexa that have been reported have been discovered accidentally or incidentally; the patients have been operated on for pelvic pain, for menorrhagia or metrorrhagia or both and in no two cases have the findings been identical.

Conservative treatment often relieves the symptoms and preserves the functions of menstruation and procreation.

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REFERENCES

1. Jordan, H. E. and Kindred, J. E. *A Textbook of Embryology*. 613 pp. New York: D. Appleton-Century Co., 1926. Pp. 265-311.
2. Bremer, J. L. *Text-book of Histology: Arranged upon an embryological basis*. Fifth edition. 580 pp. Philadelphia: P. Blakiston's Son & Co., 1936. Pp. 417-421.
3. Graves, W. P. *Gynecology*. Fourth edition. 1016 pp. Philadelphia: W. B. Saunders Co., 1928. P. 549.
4. Masson, J. C. and Kaump, D. H. A review of seventeen cases of interesting anomalies of the female genital tract. *Am. J. Obst. & Gynec.* 33:566-576, 1937.
5. Mayo, C. W. and Knepper, P. A. Congenital unilateral absence of tube and ovary. *Proc. Staff Meet., Mayo Clin.* 12:523, 1937.

6. Björkenheim, E. A. Einseitiges Fehlen des Ovariums und der Tube. *Zentralbl. f. Gynäk.* 59:794-796, 1935.
7. Mishell, D. R. Unilateral absence of the fallopian tube and ovary. *Am. J. Obst. & Gynec.* 36:705, 1938.
8. White, C. P. Congenital absence of left tube and ovary: report of case. *Illinois M. J.* 68:536-538, 1935.
9. Drosin, L. Aberrant ovary and malformed tube seen in operation for ectopic pregnancy. *M. Rec.* 141:95-97, 1935.
10. Mauro, M. Contributo allo studio della ectopia e dell'ermia inguinale dell'ovaio. *Arch. di ostet. e ginec.* 41:713-756, 1934.
11. Rudaux and Durante. Un cas d'utérus gravidé sans annexes apparentes. *Bull. Soc. d'obst. et de gynéc.* 14:639-644, 1925.
12. Dannreuther, W. T. Uterus duplex unicollis: with comments on malformations of the uterus. *Am. J. Obst. & Gynec.* 14:376-379, 1927.
13. Findley, P. Pregnancy in uterus didelphys. *Am. J. Obst. & Gynec.* 12:318-325, 1926.
14. Haynes, L. W. Uterus duplex. *Am. J. Obst. & Gynec.* 25:604-606, 1933.
15. Smith, F. R. The significance of incomplete fusion of the müllerian ducts in pregnancy and parturition, with a report on thirty-five cases. *Am. J. Obst. & Gynec.* 22:714-728, 1931.

PHYSIOTHERAPY IN RHEUMATOID ARTHRITIS*

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A RECENT health survey of chronic disease in a large cross-section of the population of this country by the United States Public Health Service|| shows that "rheumatism ranks first in prevalence, second both in producing chronic disability and in invalidity (permanent disability) and fourteenth in causing death." Rheumatoid arthritis causes a large proportion of this disability, and if untreated follows a relentless course.

The proper treatment of rheumatoid arthritis can and should be undertaken with optimism, but such treatment is of long duration and varies greatly with the individual patient. Physiotherapy is of paramount importance in all stages of the disease and is the leading factor in preventing chronic disability.

For ten years the physiotherapy program at the Robert B. Brigham Hospital has been continuously revised and improved on the basis of sound physiotherapy principles. Trial, then discard or inclusion, of countless procedures has resulted in our present methods; it is the purpose of this paper to present them.

POSTURE TRAINING

Training in body mechanics is of primary importance so that patients may develop a kinesthetic sense and form good postural habits. Faulty body mechanics produces undue strain, with resulting tendency to deformity of the joints, as well as disturbances in the respiratory, circulatory and digestive systems. If this condition is not corrected, it may contribute to a recurrence of joint symptoms due to strain and incorrect use, especially

in the lower extremities when weight-bearing is resumed.

Positions

In conjunction with training in posture, patients are placed in a hyperextended position for half-hour periods after meals. A pillow is placed under the dorsal spine and another under the knees, and the arms are extended over the head in a restful position. This brings about, as nearly as possible, the ideal weight-bearing posture, even though the patient may be forced to remain supine. Often there are patients who, because of marked kyphosis, must begin taking these positions without a pillow under the spine. No final statement can be made, therefore, as to the exact position during hyperextension and postural exercises, since adjustments must be made according to the deformities present in each case.

Exercises

Postural exercises in the supine position are explained as soon as patients are admitted to the hospital. They begin with the teaching of the correct use of the body, and the ability to maintain a position of rest without strain; for rest, in the best physiologic position, is an essential aid to recovery. The patients lie on their backs with the cervical spine extended and the arms, with elbows flexed, abducted to as near 90° as possible. This allows for a better chest position during the exercises. For teaching purposes we have found it beneficial for the physiotherapist to indicate to the patient with her hands where the muscle activity should take place. This eliminates repeated explanations and aids the patient in developing muscle sense.

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||*The Magnitude of the Chronic Disease Problem in the United States*. 19 pp. National Health Survey No. 6. Washington, D. C., National Institute of Health, 1939. P. 2.

The first postural exercise is one of simple breathing, concentrating on an expansion of the upper chest as the air is taken in. At the same time the abdominal muscles must be kept contracted to eliminate abdominal breathing. This contraction is held until the air is expelled. In the second exercise the patient is taught to localize the breathing in the middle and lower chest. He inhales as in the previous exercise, contracts the abdominal muscles and maintains the lift of the upper chest while taking series of breaths at the region of the diaphragm, thus causing a lateral spread of the lower ribs. We do not advise advancing a patient to this exercise until he has thoroughly mastered the first one. The third exercise is the so-called "rib stretch." Normal breathing is resumed, the chest is kept in a relaxed position, and the abdominal muscles are slightly contracted to keep the pelvis stable as the patient attempts to elevate the ribs, alternately to the right and left. The value of this exercise is lost if lateral flexion of the dorsal spine or elevation of the shoulders takes place. The fourth and last exercise is the so-called "pelvic tilt." Breathing is continued at a normal rate with the chest in a relaxed position. The abdominal muscles are contracted without causing tension on the thoracic muscles. Simultaneously the patient contracts the gluteal muscles, attempting to flatten the back against the bed. These exercises can be continued even when the extremities are immobilized.

Following a period of complete bed rest, these exercises are repeated with the patient sitting on the side of the bed. This procedure teaches control of muscles against gravity and serves as a transition from the lying to the standing exercises.

To perform these exercises standing, the patient assumes a position with his back against the wall. The heels should be 4 inches away from the wall, hips and shoulders touching and chin in. When the patient learns to balance the body correctly without support, the final stage of posture training is reached: that of the proper mechanics of walking. This is a new procedure for arthritic patients who have not walked for a long time, and it therefore requires careful and prolonged supervision.

The exercises are supervised twice a week by the physiotherapists, and the patients are instructed to repeat them three times daily. Each exercise is done five times at first, and the number is gradually increased to a maximum of ten.

ACTIVE MUSCLE AND JOINT EXERCISES

Static Exercises

Before the joints are splinted during the acute

stage of the disease, it is essential that the patient be taught the value of keeping up muscular nutrition and tone through the medium of muscle-setting exercises, especially of the quadriceps and the gluteals. Since muscle setting does not involve joint motion, pain or damage to the joints is not increased. The patients are shown this method of exercise immediately following admission, and continue with it while confined to solid casts or until the acute condition within the joints has subsided. We cannot stress enough the importance of obtaining the full co-operation and understanding of the patients in this matter. Without the strength maintained through repeated muscle-setting exercises, it is more difficult to progress to exercises involving joint motion.

Free Exercises

Joint exercises should be begun as soon as any degree of painless motion is possible. They are aimed at securing increased flexibility of the joints and improving muscle strength. All exercises for the extremities are done in the lying position, since thus a minimum of effort is required. The motion should be confined so far as possible to one joint of the arm or leg.

Shoulder. The tendency of the arthritic patient is to use the entire shoulder girdle when exercising the arm; therefore we prefer bilateral performance in shoulder and elbow exercises. The pull of gravity is partially overcome if the elbows are kept in a flexed position while the shoulders are exercised in the anteroposterior and lateral planes. When muscle strength becomes sufficient to raise the arms with elbows extended, circumduction, beginning with a forward and upward pull, replaces the previous exercises. Free range of motion is permitted because fatigue and discouragement will arise if too much stress is put on the use of specific muscle groups to bring about the desired action.

Elbow. In exercising the elbow, the arthritic patient habitually eliminates supination and pronation. We have seen an increase in the tendency to subluxation in the elbow joint when these motions are not properly combined with flexion and extension.

Wrist and hand. Active exercises of the wrist and hand are seldom prescribed when ulnar deviation or flexion deformity is present, since it would be impossible for the patient to maintain a position beneficial for exercise. However, following manipulations when a corrected position has been obtained, flexion or extension exercises are taught as indicated by the degree of correction.

Hip. Owing to the inability of patients to lie

prone, hip-extension exercises are comparatively ineffective. We compensate for this by giving exercises in the hydrotherapy tank or by using elastic traction (Fig. 1). It is seldom necessary to in-

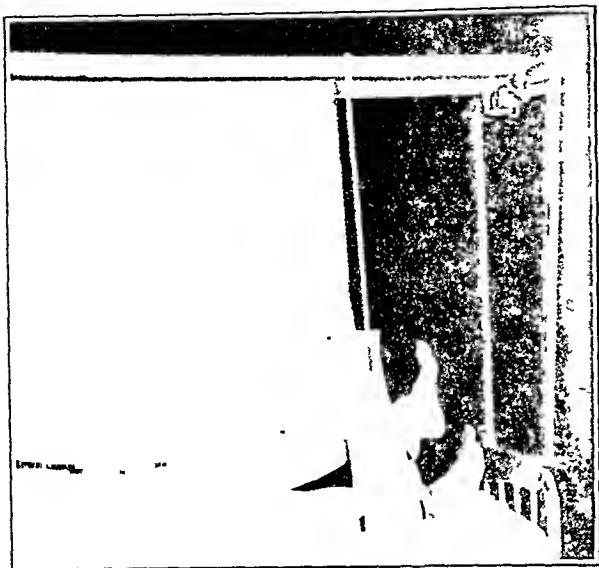


FIGURE 1.

struct patients in hip-flexion exercises because of the flexibility obtained from the position assumed at mealtimes and during recreation.

Knee. As a variation of the quadriceps-setting exercise, an attempt is made to lift the heel off the bed without raising the thigh. This exercise is possible only for those patients who are able to extend the knee fully. Knee extension against gravity is given as the strength in the quadriceps muscle increases and the patients become able to assume a sitting position. Performed in this way the common error of substituting hip flexion for quadriceps contraction is largely avoided.

Ankle and foot. To help in overcoming functional deformities in the foot, routine exercises are prescribed. Flexion and extension of the ankle are practiced for flexibility, and if performed slowly will aid in increasing muscle strength. The combined motions of plantar flexion, inversion and dorsal flexion, with emphasis on the inward and upward pull, are beneficial to the tarsal arch. When flexing the toes to improve the strength of the intrinsic muscles of the foot, the patient is told to maintain as great a degree of dorsal flexion of the ankle as possible.

During the patient's stay in the hospital, all active joint exercises are carried out three times daily. Each exercise is done only a few times at first, and the repetitions are gradually increased according to the muscle strength gained. The ex-

ercises are supervised by the physiotherapists twice a week, at the time when the postural exercises are checked.

Assisted Exercises

The improvement of patients with marked muscle atrophy is more rapid if they are assisted in some of their exercises. This applies particularly to leg exercises, which are simplified by the use of elastic traction. This consists of a wide, felt-lined canvas cuff suspended by a cable elastic from overhead frames. The cuff, which is placed just above the ankle, is sufficient to eliminate the friction of the bed in lateral hip motions and to offer enough resistance to overcome the pull of gravity in hip extension (Fig. 1). It may also be employed to encourage knee activity, when it should be placed just below the knee. Both legs are drawn up, and extension is attempted with each leg alternately; this is shown in Figure 2, in which only the right knee is flexed. Care must be taken that the hip is held stationary as the knee is extended; otherwise the patient may institute hip motion, which, modified by the elastic traction,



FIGURE 2.

will give flexion and extension of the knee without contraction of the quadriceps muscle.

Another method of aiding muscle function is by underwater exercise. Its value lies not only in the supporting action of the water and the relaxation gained through increased body warmth, but also in the encouragement given to the semihelpless patient.

Restricted Exercises

As active motion becomes freer, it is necessary to restrict undesired movement by supporting, in a

correct position, the part to be exercised, as, for example, by stabilizing the shoulder girdle while shoulder exercises are carried out. In treating elbows following operation for arthroplasty, it is essential to give the same type of assistance, holding down the shoulder as the elbow moves. Previous to an arthroplasty for relief of ankylosis in the elbow joint, the patient has been accustomed to using the arm as a whole, it is the duty of the physiotherapist to help him overcome this habit.

Before he can exercise the hand properly, it is necessary to eliminate deformities that can be corrected passively. The commonest of these are ulnar deviation and subluxation of the metacarpophalangeal joints. To maintain proper alignment of the bones, so that the maximum pull of the muscles may be obtained, pressure is exerted along the ulnar border and under the metacarpal heads. With this support the muscles contract to better advantage, or if subluxation is overcome, are restored to their normal course with a minimum of joint strain.

It is rarely necessary to stabilize the pelvis during this type of hip exercise. If the opposite leg can be abducted, the weight of the leg and pelvis is sufficient to hold the body so that motion occurs in the hip joint alone. An exception occurs in underwater exercises, in which the movement tends to be along the path of least resistance and the patient substitutes activity in the lumbar spine to compensate for the limited hip motion.

In those joints in which two muscle groups work simultaneously, support must be given to the moving part to stop motion of the undesired muscle group, for example, in abduction of the hip, rotation must be guarded against. Such lack of co-ordination is particularly evident following an arthroplasty or osteotomy.

Resisted Exercises

It is not usually our custom to offer resistance in joint exercises, owing to the tendency toward subluxation of the joints. Although such exercises are beneficial to the musculature, they are detrimental to a joint when its structure is impaired. Resistance to the exercises may be offered in cases in which a joint has been only mildly involved and there is, except for muscle atrophy, a complete return of function.

FORCED MOTION

Joint Stretching

Regardless of the amount of active exercise that a patient can perform, the range of free motion in a joint is limited by adhesions and contrac-

tures. Therefore, when the disease becomes quiescent and the joint symptoms subside, it is necessary to stretch the fibrous adhesions. A standardized procedure is essential in order that the patient may know what to expect. The process is at best painful, and increased spasm and contracture, due to fear, must be avoided. As patients become accustomed to one method of treatment they become less apprehensive and can concentrate on relaxing. Traction must be applied when stretching arthritic joints, to relieve friction within the joints and to avoid the possibility of fracture. The patient's tolerance will not permit more than three or four stretchings at a time in any one direction. Pain is lessened if a few strokes of massage are interspersed with the exercises. The process should seldom be repeated more than three times a week, except for the postoperative cases, which should be treated daily. If increased stiffness results and constant pain persists, treatment should be discontinued.

Shoulder The first consideration in exercising the shoulder is stabilization of the acromioclavicular joint. The physiotherapist places one hand firmly over this articulation, but in a position that will not interfere with the larger tubercle of the humerus, the other hand is placed over the posterior aspect of the humerus a few inches below the glenoid. At the termination of the arc of active motion, it is necessary for the patient to relax completely, so that traction may be applied at this point, it must be maintained throughout the stretching process. Care should be taken to equalize the force between the downward pressure on the shoulder girdle and the upward lift of the humerus. We cannot specify the degree of increased motion that can be obtained, since this will vary with individual cases and according to the amount of destruction within the joint. Flexion and extension must take place in the direct anteroposterior plane, with precautions against rotation of the humerus. If the rest of the arm is involved, support should be given to the elbow and wrist. To eliminate all strain the stretching process must be confined to one articulation at a time. Abduction may be assisted in the same manner without altering the position of either the patient or the physiotherapist. The motion must not be carried beyond the 90° angle, because motion above that point will involve the whole shoulder girdle. Owing to the possibility of fracturing the surgical neck of the humerus, stretching in inward and outward rotation is not advisable unless the patient can abduct the arm to shoulder level. In such cases the elbow is flexed to a right angle, and

traction is applied to the humerus. With the traction held firmly there will be no elevation of the shoulder girdle; this eliminates the necessity of holding down the acromioclavicular articulation. The traction can be maintained and at the same time pressure exerted on the forearm, stretching the shoulder in inward and outward rotation (Fig. 3). It usually follows that adhesions



FIGURE 3.

are no longer present when the shoulder can be fully rotated outward, that is, the arm placed in the aforementioned position with the dorsal surface of the hand and the entire forearm in contact with the bed.

Elbow. For stretching the elbow joint the arm is brought in close to the side. To avoid pressure of the elbow against the bed, the physiotherapist places one hand under the arm and in this position firmly grasps the humerus at the level of the condyles; the other hand, which will supply the traction, grasps the forearm near the joint. This traction must be applied equally on both radius and ulnar, for an unequal pull will so affect the alignment of the bones that injury to both elbow and wrist may result. Supination is attempted simultaneously with flexion. When stretching in the combined motions of extension and pronation, if limitation is slight it is well to change the hold on the forearm to an overhand grasp; this releases pressure on the muscles and eliminates pinching of the skin. Relaxation of the shoulder must be maintained throughout this procedure, since there is a tendency to compensate for lack of elbow extension by raising the shoulder joint.

Wrist and hand. Adequate traction is difficult to apply in the wrist, owing to the arrangement of the carpal bones. The factors for consideration are an increase in the flexibility of the joints and the stretching of the carpo-ulnaris muscles. This is best accomplished by placing the supporting hand just above the wrist against the radial border of the forearm and the stretching hand just be-

low the wrist against the ulnar border of the hand, with the fingers around the parts parallel to the wrist joint. Because of the disagreeable sensation caused, it is well not to exert extreme pressure over the radial artery.

The metacarpophalangeal joints should be stretched individually. Pressure is exerted on the palmar surface of each metacarpal head to restrict motion in the carpometacarpal junction. Traction is maintained on the adjacent proximal phalanx, with the fingers holding the lateral aspect, close to the joint. This position allows for free movement of the tendons that cross the dorsal and palmar surfaces of the articulations. All interphalangeal joints are stretched in like manner. It is of the utmost importance that these small joints be stretched with a short leverage, since there is constant danger of fracture, owing to the bone atrophy so often present.

Hip. Satisfactory stretching of the hip joint cannot be executed by one physiotherapist alone. The pelvis must be stabilized bilaterally to provide countertraction to offset the amount of traction applied. The lower leg should be supported, and all traction must be applied above the knee. This requires the combined efforts of two physiotherapists; one stabilizes the pelvis, while the other applies the traction, assists with the motion and at the same time eliminates rotation of the femur. This technic is particularly valuable following arthroplasties of the hip, and should be carried out daily over an extended period of time. Following surgical operations on the hip joint, patients are able to do muscle-setting exercises, but because of the weight of the femur and the temporary damage to muscle fibers, active motion is slow to return. Therefore, to maintain mobility of the hip joint, assistance must be given. As pain and muscle spasm subside, motion may be increased by careful stretching. When weight bearing is resumed, there is a tendency toward contraction of the tissues that necessitates an increase in the amount of traction as the joint is stretched.

Knee. This joint is extremely susceptible to damage if stretched improperly. Its structure is such that subluxation may easily occur or increase unless a short leverage is used with traction equally distributed on the tibia and fibula, avoiding outward rotation. Of relative importance in stretching the knee is the position of the hip joint. In stretching a flexion deformity no motion should occur in the hip. Therefore, the hip must remain semiflexed throughout the process. The hand supplying the traction on the lower leg exerts pressure upward under the calf. The other hand, placed over the femoral condyles, exerts downward force to equalize the pressure and steady the femur.

When marked flexion deformity is present, every effort is made to reduce posterior subluxation of the tibia as well as to decrease the angle of deformity. During the process of stretching, constant attention is given to hold the improved alignment of the bones while an increase in the mobility of the joint is attempted. Following operative procedures or extensive treatment in solid casts, it may be necessary to assist patients to regain flexion of the knee. It must be borne in mind that the end result should include ability to perform complete extension while retaining as much power of flexion as possible. If the hip can be flexed, a more effective stretching in knee flexion can be accomplished, with less risk to the femur owing to relaxation of the rectus femoris muscle. We believe that this undesired position of hip flexion is held so briefly that it is offset by the gain to the knee.

Ankle and foot. Owing to the general structure of the ankle, it is unwise to apply traction when giving assistive exercises, since too much strain on the ligaments results. The ankle may be forced in either plantar or dorsal flexion according to the deformity present, and so far as possible eversion should be eliminated. The latter position is often associated with peroneal spasm, so that stretching should be used as a preliminary to immobilization in casts. Limitation of motion in the tarsometatarsal joints is usually present with the common deformity of valgus. This deformity requires careful and selective stretching in inversion, with the foot supported in a neutral position.

The metatarsophalangeal joints are stretched in flexion with a technic identical to that used on the corresponding joints of the hand. The foot is held in dorsiflexion and ample support is given under the metatarsal heads, while each toe is stretched separately. If hallux-valgus deformity is present it will cause considerable disorganization of the metatarsophalangeal joints. Therefore, stress must be placed on correct alignment of the bones during the stretching process.

The force of gravity may sometimes be used to help increase joint motion, although it is seldom sufficient to overcome the strength of muscle spasm or the adhesions present. However, in some cases gravity can be used to help patients increase the flexibility of their own joints, for example, dangling their legs over the side of the bed to regain knee flexion.

Manipulation

This method of forced motion is classified as a surgical procedure. Joints are manipulated.

anesthesia by the surgeon and returned to
improved position, and the patient returned
mediately returned to position of the
hesions.

Passive Movement

The use of passive movement in the treatment of rheumatoid arthritis is limited. It could be well if joints in the active stage of arthritis were put through their full range of passive motion every day. However, if patients are unable to perform any active motion without pain, they usually experience pain at the end of an attempt at passive movement, and this may lead to an increase in pain.

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contains few reports of cases in which endometrial cysts of the undevolved size reported in subjects. In this, a statement by [unclear] says, "... that adenocarcinoma is an increased growth of the endometrium, that it does not

a marked hyperemia and aids in the reduction of pain.

FOLLOW-UP PROCEDURE

Although not a form of treatment, photography for record purposes is an important part of our follow-up work. This procedure is undertaken by the Department of Physical Therapy. Photographs are taken of all patients on admission, previous to and following operations, and at varying intervals when they return to the clinic. These photographs consist of anterior, posterior and lateral views of the standing position of ambulatory patients and of views of the characteristic lying position of nonambulatory patients. Photography of visible deformities and composite pictures showing limited joint motion are of great value in following the patients' progress.

Following discharge from the hospital continued encouragement and supervision are given to these arthritic patients under the direction of the Home Service Department. Arrangements are made for patients to attend home-service clinics, and a complete survey is made of all outlined treatments that the patients have been directed to follow at home. The physiotherapist reviews all exercises and makes necessary corrections or additions.

SUMMARY

The program of physiotherapy for arthritic patients now in use at the Robert B. Brigham Hospital is discussed. Details of the technics used are given from the viewpoint of a physician-in-charge, working with an experienced physiotherapist.

PEDUNCULATED ENDOMETRIAL CYST OF THE UTERUS

Report of a Case

ALEXANDER A. LEVI, M.D.*

BOSTON

IN THE case reported herein, a pedunculated endometrial cyst of the endometrium, 3.5 cm. in diameter, was removed at operation. Such a cyst is rarely seen by pathologists or surgeons, so that its discovery aroused considerable comment. This paper is therefore intended chiefly as a case report, but it also draws attention to the variety of pathologic changes which may involve the pelvic organs at the same time.

The patient was operated on twice, the procedure employed during the second operation being governed by the pathologic findings at the first.

CASE REPORT

S. G., a 39-year-old woman, was first examined by me on September 16, 1939. She had been married for 21 years and had had three pregnancies, the oldest child being 19 and the youngest 13. There had been no miscarriages. The menses began at the age of 13 and occurred regularly every 28 days, lasting for 5 days. Two previous operations had been performed, a hemorrhoidectomy at the Boston City Hospital in 1936, and a dilatation and curettage, a Kelly advancement operation and anterior and posterior colporrhaphy at the Beth Israel Hospital on October 21, 1938. Following the latter operation an intravenous pyelogram was taken because of urinary complications. During this procedure a dermoid cyst of the left ovary was diagnosed.

The patient stated that since the last operation she had had pain in the left lower abdomen; her menses had been regular, and accompanied by severe pain just before and during each period. The last period had occurred on August 25. There was severe flow, and large clots were passed. Three weeks later the severe flow recurred. The

bleeding continued actively, including the day on which examination was performed.

Examination showed the uterus to be in a normal position, about one third larger than normal, and tender. A hard mass, presumably a fibroid, half the size of a golf ball could be palpated in the right uterine wall above the cervicofundal junction. The right vault was normal. The left contained a movable tumor mass—the dermoid cyst—10 cm. in diameter. The cervix was dilated, and a tumor mass 4 cm. in diameter projected partially through the external os. It was reddish blue and firm. Blood flowed profusely about it and out of the cervix.

The patient was operated on by me at the Evangeline Booth Hospital on September 17. At preoperative examination, under general anesthesia, the cervix admitted three or four fingers. On exploration with the finger a long pedicle was discovered coursing from the top of the intracervical tumor mass to its point of attachment, high in the uterine cavity on the right. The mass was dissected manually; the pedicle was cut at its base and the mass was removed intact. The uterine cavity was then curetted. A moderate amount of curettings was obtained.

Pathological examination of the tissues was performed at Tufts College Medical School by Dr. H. E. MacMahon. The report reads as follows:

Specimen A consists grossly of a piece of tissue, circular, flat and measuring 2.5 by 2.0 by 0.3 cm. One surface is pigmented and granular, the other is rough and dissected microscopically. This is a strip of endometrial tissue with underlying myometrial smooth muscle. The endometrium shows a few glands surrounded by little or no stroma extending into the underlying muscle.

Specimen B consists of a globular mass 3.5 cm. in diameter, fluctuant and opaque. One surface is bare and dissected and in this area the wall is thin. A larger area is covered by a layer of dense, opaque, bloodstained, skinlike tissue. Section of the mass

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shows a smooth-walled cyst varying from 0.1 to 0.4 cm. in thickness and filled with chocolate-colored fluid. Microscopically, the cyst is lined by flattened, compressed and atrophic endometrium, composed of a single layer of flattened epithelial cells and a narrow zone of endometrial stroma. There is a layer of flattened atrophic muscle lateral to the stroma, and the outer surface is bordered by endometrium.

Diagnosis: pedunculated endometrial cyst of the uterus, showing no evidence of malignancy.

Note. I should consider these findings consistent with an endometrial cyst that has enlarged and filled the endometrial cavity like a polyp. The presence of the smooth muscle bordering the cyst indicates that it has originated in the myometrium rather than in the endometrium, as was suggested in the gross diagnosis.

The accompanying photographs (Figs. 1 and 2) demonstrate the size and structure of the cyst.

Although it was known at this time that an intramural fibroid tumor and dermoid cyst of the left ovary were



FIGURE 1. *Pedunculated Endometrial Cyst of the Uterus.*

present, abdominal surgery was not done. The patient's condition was unsatisfactory, as a result of the marked blood loss which she had suffered prior to this operation. Furthermore, it seemed unwise to subject her to an abdominal operation when it was known that she had had a dilated cervix for an indefinite period of time.

On January 4, 1940, I again operated on the patient at the Evangeline Booth Hospital. The operation, performed in two stages, consisted of dilatation, curettage and perineorrhaphy, and supravaginal hysterectomy and bilateral salpingo-oophorectomy.

During the curettage it was noted that the endometrial tissue was extremely thick and more abundant than usual. Because of this finding and the previous pathological diagnosis, I felt justified in making a diagnosis of endometriosis of the uterine wall. With this background and the knowledge of the existence of a large dermoid cyst on the left side, I decided to remove the right ovary as well. The pathological report of the tissues removed at this operation and examined at Tufts College Medical School by Dr. James M. McFadden reads as follows:

The specimen consists of the body of a uterus measuring 6 by 7 by 4 cm. with the left tube and ovary attached. There is a 1.5-cm. laceration on the superior surface of the fundus, apparently rendered at time of removal. There is a firm leiomyoma about 2 cm. in diameter, with a firm, cut surface and sworled appearance, in the right aspect of the cervix. Also there are small grayish brown spots measuring up to 2 mm. in

diameter, located anteriorly to the uterine cavity and slightly to the right of the midline. These are consistent in gross appearance with endometriosis. The endometrium measures approximately 3 mm. in thickness. It is soft and gray with a bloodstained surface.

The fallopian tube is slender and measures 7.0 by 0.6 cm., and is stretched over the surface of a large ovarian cyst measuring 7.5 by 7.0 by 5.5 cm. Upon sectioning the ovarian cyst, the wall is seen to be thin, with a rough inner surface and a moderate growth of hair. The cavity is filled with a sticky, yellowish-gray, sebaceous-like material. There is a ridge on the inner surface measuring 1.5 by 1.0 cm. Sections of this ridge reveal a moderately firm, grayish-white, smooth, cut surface. Close by is a small hard area, and when it is opened two teeth of the incisor pattern are found, completely imbedded in the cyst wall. Also at one pole there is a corpus luteum 2 cm. in diameter.

The additional specimen consists of a free tube and ovary. The tube is small and has a normal gross appearance. The ovary measures 4 cm. in diameter, and section reveals numerous small follicular cysts and a corpus luteum. There are small hydatid cysts on the surface of the tube.

Microscopically, the sections of the dermoid cyst show the thin portion to be lined by stratified squamous epithelium. Sections through the ridge show this epithelium covering a mass of mucous glands. Also there is a small strip of cartilage present, some smooth

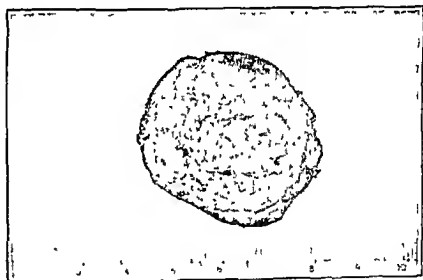


FIGURE 2. *Pedunculated Endometrial Cyst of the Uterus.*

muscle, and hollow structures lined by pseudo-stratified ciliated epithelium, similar in appearance to the respiratory type. The corpus luteum is noted. Sections of the uterine wall prove the small brown spots noted grossly to be endometrial islands. The leiomyoma is noted. The endometrium is in the early lutein phase. The fallopian tube is scarred. There is no evidence of malignancy.

Diagnosis: dermoid cyst of the ovary; corpus luteum and follicular cysts of the ovary; leiomyoma of the uterine cervix; endometriosis of the uterus (endometrium in early lutein phase).

The literature contains few reports of cases in which pedunculated endometrial cysts of the endometrium have developed to the size reported in this paper. To substantiate this, a statement by Novak¹ is offered. He says, "... that adenomyosis represents merely an increased growth activity of otherwise normal tissues, that it does not

assume the circumscribed form so characteristic of genuine neoplasms. . . ."

Changes representative of endometriosis less often involve the uterus. They are most frequently found in the pelvis or abdomen. Crile² writes:

Endometriosis is defined as the presence of endometrial tissue in ectopic locations. . . . Endometrial tissue may be implanted on the ovary, on the pelvic peritoneum, in the umbilicus, in the rectovaginal septum or in the laparotomy scars. It functions as endometrium, undergoing the cyclic changes of menstruation. It is, therefore, capable of forming cysts of retained blood (chocolate cysts) and of producing pain at the time of menstruation. . . . It is interesting to note that more than 24 per cent of 37 patients in this series had fibroids of the uterus, endometriosis and menorrhagia. This association has been noted in other series of cases and cannot fail to suggest that there may be an underlying endocrine factor which could well be responsible for all three conditions.

This statement is quoted because it focuses attention on the variety of pelvic disease found in this case.

As to the rarity of such cysts, Masson³ reports a study on the situations of adenomyomas found at operations performed from 1923 through 1934, in-

clusive. A total of 576 patients were operated on, but not one case disclosed the presence of a pedunculated endometrial cyst similar to that reported in this paper.

SUMMARY

A case is reported of a thirty-nine-year-old woman in whom the following were found at the same time: a pedunculated endometrial cyst of the uterus, endometriosis of the uterine wall, an intramural fibroid and a dermoid cyst of the ovary.

In spite of the presence of multiple pathologic entities in the pelvis, almost no unusual changes occurred in the menstrual cycle.

Although endometriosis of the uterine wall is not rare, large endometrial cysts of the uterus are uncommon.

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REFERENCES

1. Novak, E. *Gynecological and Obstetrical Pathology with Clinical and Endocrine Relations*. 496 pp. Philadelphia and London: W. B. Saunders Co., 1940. P. 180.
2. Crile, G., Jr. Endometriosis: a clinical study of thirty-seven cases. *Cleveland Clin. Quart.* 4:303-308, 1937.
3. Masson, J. C. Surgical significance of endometriosis. *Ann. Surg.* 102:819-833, 1935.

MEDICAL PROGRESS

ABDOMINAL SURGERY

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DURING the past year many outstanding contributions have been made in the field of abdominal surgery. Some of the timeliest and most useful subjects are recorded.

ANESTHESIA

Bartlett³ has described in detail a useful method of anesthesia for upper abdominal surgery. This consists in blocking the intercostal nerves from the seventh through the eleventh in the midaxillary line on both sides with 2 per cent novocain. He recommends that this be accomplished under light nitrous oxide and oxygen inhalation, which may be continued throughout the operation. Ten minutes is necessary to obtain the full effect of the novocain. This method has been used at the Massachusetts General Hospital in gastric as well as biliary-tract surgery with considerable satisfaction. Evipal or a similar preparation given intravenously can be substituted for nitrous oxide and oxygen. Splanchnic block by Ogilvie's² method added to intercostal block is helpful. Subcostal or transverse incisions are more easily closed when this type of anesthesia is used, although added relaxation of the abdominal wall can be obtained by novocain infiltration into the rectus sheaths.

WOUND HEALING

Whipple⁴ selected the subject of the critical latent or lag period in the healing of wounds for his presidential address before the American Surgical Association at its annual meeting in 1940. He discusses the local and systemic conditions pertaining to wound healing. The local factors are the amount of killed or damaged tissue in wound surfaces, the vascularity of the tissues involved, the integrity of blood flow to the damaged tissue, the amount and character of the exudate in the wound space, the number and character of infectious organisms present and the number and character of foreign bodies to be extruded or encapsulated. The systemic factors are the age of the tissues (whether they are adolescent, normal adult, or senescent and degenerated), the state of hydration,

nutritional balance, vitamin balance and the state of the general circulation and blood.

He describes the lag period as being that time between the receipt of the wound and the beginning of tensile strength between the approximated structures. Local factors are mainly the responsibility of the surgeon at the time of operation; they are sharp dissection, careful hemostasis, gentleness of touch, careful protection of the wound and the use of fine nonabsorbable suture material. The systemic factors are dealt with beforehand as much as possible, and this is continued during the convalescent period.

Coller and Valk⁴ present a logical revival of the delayed closure of infected wounds. They recommend that the fat and skin be loosely packed open with acriflavin gauze, and that sutures be placed at the time of operation and tied on removal of the gauze twenty-four hours later. This is particularly adaptable to wounds made in the closure of colostomies, fecal fistulas and perforated appendices. The results are superior to those in wounds closed partially over drains of one sort or another. I have used their suggestion extensively with great satisfaction, and have found that iodoform gauze is fully as effective as acriflavin gauze. In some cases it is wise to use a small dose of Pentothal Sodium intravenously when tying the final sutures.

Cutler and Dunphy⁵ present experimental and clinical evidence that fine silk in the closure of infected wounds is far superior to catgut. The amount of silk discharged from such a wound is no greater than in clean wounds. Hernia in the scar very rarely occurs when silk has been used, whereas it is a frequent sequel to infection when the wound had been closed with catgut. In frankly infected wounds, such as occur during operations for suppurative appendicitis, the layers of the abdominal wall are built up with interrupted fine silk sutures, but the skin itself is not closed. It occurred to Kelly⁶ that the skin of such a wound might be safely closed at a later date, according to Coller's suggestion.

Meade and Ochsner⁷ present excellent experimental and clinical evidence that cotton thread has all the advantages of silk in the repair of wounds, and in some respects other than its low cost is superior.

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PENETRATING WOUNDS OF THE ABDOMEN

Two excellent presentations on penetrating wounds of the abdomen have come forth during the past year, those by Storck⁸ and Rippy.⁹ Both these authors analyzed the wounds according to severity, the viscera injured, the number of perforations, the age, sex and color of the patient and the time interval between injury and operation. The mortality is quite high, approximately 33 per cent. Early operation, performed as soon as shock can be combated, is recommended in all cases save shotgun wounds sustained at some distance from the weapon. Blood and plasma banks, better transportation facilities and the use of sulfanilamide, it is prophesied, will reduce mortality.

HERNIA

Warvi and Orr¹⁰ review the literature on hernia, discuss the embryology and anatomy and report a case of supravescical hernia. This is one of the infrequent causes of acute intestinal obstruction. The authors believe that hernia of the intestine in and about the urinary bladder is commoner than is usually thought, and suggest having this in mind when dealing with small-bowel obstruction.

Rienhoff¹¹ offers a modification of the Halsted "second" operation for inguinal hernia. He maintains that recurrence often takes place in the lower or critical angle of the wound, since structures in this area are prone to contain little or no fascia that can be easily approximated. This has been recognized by many surgeons, and various ways of correcting it have been offered. Rienhoff elevates the external oblique fascia to uncover as much of the lower rectus sheath as possible; then a longitudinal incision is made through the rectus fascia near the midline. He asserts that this allows the lower edge of the fascia, which is contiguous with the internal oblique, to be sutured to Poupart's ligament without tension. The cord is undisturbed and the cremaster utilized in the manner described in Halsted's second and finally adopted operation.

APPENDICITIS

Ravdin, Rhoads and Lockwood¹² report on a series of patients with appendiceal peritonitis treated by operation and sulfanilamide by hypodermoclysis. They have demonstrated experimentally that the drug reaches the blood level in the peritoneal fluid very quickly. They admit that their series is yet too small for accurate conclusions, but in comparison with a previous series of patients treated in the same clinic, one is impressed by the possibilities of the newer method. Delayed operation for better localization was used in approximately

2 per cent of cases. Wound drainage was used in 38 per cent of cases. Wangenstein-Paine suction was used routinely until there was active peristalsis and free passage of gas from the bowels. Sulfanilamide therapy was continued from five to seven days postoperatively. The mortality in the previous group of 552 patients was 1.4 per cent, whereas in 257 similar cases treated by the addition of sulfanilamide it was 0.4 per cent.

Barrow and Ochsner¹³ have collected statistical data indicating that the mortality rate in appendicitis is not rising, as has been frequently stated, but is actually decreasing. They attribute this fact to a better understanding and management of appendiceal peritonitis.

ULCERS OF THE STOMACH AND DUODENUM

Contributions continue with considerable profusion on the subject of ulcers of the stomach and duodenum. That ulcerative lesions of the stomach must be considered malignant until proved benign is a dictum that is gaining favor. Such patients are being more carefully followed and subjected to surgery, unless rapid and complete healing can be demonstrated radiologically or by the gastroscope. Physicians are no longer misguided by the frequent improvement of symptoms and the early decrease in the size of the crater when palliative measures are tried. Increasing numbers of patients are benefited by early resection, while the carcinoma is still in situ and therefore curable. Patients developing first symptoms after middle life who have a gastric ulceration are so likely to have a malignant lesion that little time should be wasted on palliative treatment.

Subtotal gastrectomy for duodenal ulcer is giving a high percentage of patients who continue to be symptom free. The operative mortality for such procedures is now very low in the hands of men experienced in this field. Walters¹⁴ and McClure and Fallis¹⁵ reported their experiences during the past year.

The amount of stomach removed in square centimeters has also interested Wangenstein et al.¹⁶ Their analysis concerning the permanent lowering of the gastric acidity following various surgical procedures is interesting but not too convincing, especially in regard to the Finsterer exclusion procedure. Many surgeons have been faced with stomal ulcers following this operation, and believe that the antrum should never be left in situ unless the mucosa has been removed. I am not too pleased with it even so, since, although the acid-activating hormone may be removed by eliminating the mucosa, a poor structure to close is left. Two nonfatal leakages have occurred in my own series

of such operations, and for this reason I believe that extirpation of the antral segment with as much of the fundus as possible should be done whenever possible.

Zollinger¹⁷ suggests a plan for radical fundus-sectomy, particularly when dealing with secondary ulcerations. His operation is well conceived, and on occasion may be of value. Simpler methods, however, seem adequate, provided an effort is really made to include a large segment of the fundus in routine subtotal gastrectomy.

More awareness of the hazard of massive hemorrhage from gastric and duodenal ulcer is apparent. Hinton and Maier¹⁸ believe that the chronicity of the ulcer is a better explanation of fatal bleeding than is the age of the patient. At the Massachusetts General Hospital, we¹⁹ analyzed our own cases on the basis of all factors, including duration of symptoms, and were disappointed that our preconceived idea of chronicity was not evident in the fatal group. The dividing line of approximately fifty years of age between those who spontaneously recovered and those who died was an unexpected finding. It has held true in our clinic, and we have been able to rescue 8 patients with duodenal and 3 with gastric ulcerations above the age of forty-eight from acute massive hemorrhage by early radical operation; during this time none below this age have bled to death on conservative treatment. The fact that Hinton and Maier¹⁸ have been able to obtain a better history and thus interpret their findings on the basis of a long standing callous ulcer is of additional importance, and suggests another way of selecting the proper patient for operation. Wangenstein²⁰ believes that the age or chronicity factors are not so vital as the stage of shock produced by the hemorrhage. If profound shock occurs, it should be combated and radical operation undertaken. I doubt the soundness of this policy, since we have seen many patients in the most profound shock, even with repeated episodes over a period of several days, recover. Those with elastic blood vessels will make a recovery so that operation can be undertaken at an optimum time of election. One may argue that the mortality in modern gastrectomy is so low that one need not worry about those who may die or recover from hemorrhage, and may advocate early operation on them all, as does Finsterer.²¹ Economically, this is sound. In practice, however, when large groups of statistics are available the added risk during acute hemorrhage in the young patient is unjustifiable. Graham, Horsley, Hinton and Clute in an unpublished panel discussion on "Acute Massive Hemorrhage from Peptic Ulcer" agreed on many important points.

First, conservative management of most patients during the acute phase is the correct method of treatment. Second, operation, if undertaken, should be a radical procedure with ligation of the vessels supplying the ulcer area; this should be done early before depletion of the tissues has taken place or not at all. Third, the occasion for such a procedure is rare, but if well conceived at the right time and on the right patient, a rescue may be made. Fourth, early feeding is reasonable, but the patient must desire the food and not be forced to take it. Fifth, feedings may be of any type so long as the food is finely divided and smooth.

RARE TUMORS OF THE ABDOMEN

Lahey and Colcock²² have reported on 7 cases of leiomyoma and leiomyosarcoma of the stomach treated in the Lahey Clinic. Five of their cases showed sarcomatous degeneration, and for this reason they advocate radical resection rather than local removal of the tumor. One of their cases required total gastrectomy. The tendency for such lesions to bleed profusely is well known, the first symptom being that of massive hemorrhage. Often the lesions are mistaken for inoperable carcinoma. Many of these tumors are quite benign, but the determination of this point cannot be made until the sections have been studied.

Ransom and Kay²³ call attention to the frequency of tumors of neurogenic origin commonly supposed to be leiomyomas, and report 9 cases with such tumors of the stomach encountered in a total group of 18 cases with neurogenic tumors of the abdomen. Radical surgery, they hold, is indicated when possible in this type of tumor, since many of them are sarcomatous. The results have justified this radical attitude. Morton²⁴ calls attention to a very large tumor of this nature that was reduced to an operable state by previous radiation. Miller²⁵ has had a similar experience with postoperative radiation in a large neurogenic sarcoma involving the bladder.

CARCINOMA OF THE STOMACH

There is a gradual awakening among the profession to the terrific toll of human life taken by carcinoma of the stomach. Probably not less than 30,000 deaths occur every year in the United States from this cause. It is gratifying to learn that Surgeon General Parran plans an educational campaign on this subject in the near future. So far, the etiology is unknown. Some cases appear to develop from a benign ulcer, but proof of this is hard to establish. Early diagnosis followed by immediate operation is the only way to improve the very discouraging cure rate. At present, on all

figures available for follow-up studies, the percentage of five-year cures in cancer of the stomach is approximately 5. It is discouraging to the surgeon to be able to rescue so few patients admitted to the hospital with this diagnosis. Palliative resections are justifiable whenever possible, since many of these patients have a respite of two or three years.

The most valuable measures to improve the situation are as follows. Every ulcerating lesion of the stomach must be considered malignant until proved benign; this means constant supervision until the ulcer is completely healed and remains healed by follow-up examinations. Symptoms of stomach disorders beginning after the age of forty must be considered to be due to cancer of the stomach until proved otherwise; symptoms and physical examination must be carefully evaluated; gastric analysis, x-ray studies and gastroscopy must all be employed in an effort to find the lesion. Ulceration of the stomach manifesting itself for the first time and without previous symptoms after the age of forty is so likely to prove malignant that palliative treatment should be of very short duration or entirely abandoned in favor of early radical surgery. The laity must become conscious of this danger and must be warned against delay in reporting their symptoms to their physicians. Legislation should be sought to limit the advertising of remedies for indigestion, particularly over the radio.

Contributions to the technic of gastrectomy for carcinoma are as follows. Wangenstein²⁶ demonstrates a feasible aseptic gastric resection for subtotal gastrectomy. This is particularly applicable to the achlorhydric stomach involved with a localized infected carcinoma. Smithwick²⁷ has developed an aseptic technic applicable to total as well as subtotal gastrectomy and colectomy. This is based on the production of a firm char of healthy tissue over a broad clamp with a slow cautery. A basting stitch is placed through the eschar, and the anastomosis made without danger of leakage. It is possible that the use of some such chemical as sulfanilguanidine²⁸ may eliminate most of the danger of infection during operations on the gastrointestinal tract. This drug is said to be absorbed poorly by the host and to rid the tract of infectious organisms in a short time when administered by mouth.

Graham²⁹ has published his results with total gastrectomy for advanced carcinoma. Owing to difficulty with leakage at the esophagojejunal anastomosis by the usual methods, he suggests a modification that encloses the lower end of the esophagus in the loop of jejunum. This is done in such a manner as to bring a very broad surface of the

serosa of the jejunum in contact with the external layers of the esophagus. The jejunal loop is also carefully suspended from the diaphragm. Total gastrectomies for extensive cancer have been performed in more than 50 cases by the staff of the Massachusetts General Hospital. The procedure is now well standardized, and the immediate results are excellent.

DUODENAL DIVERTICULA

Morton³⁰ has collected the surgical literature on duodenal diverticula and summarizes the operations in 49 cases reported since 1915. He adds 2 cases operated on in the University of Rochester Clinic, commenting on the fact that the diagnosis of primary diverticulosis of the duodenum had been made in that clinic in at least 33 cases. This emphasizes the frequency of the lesion itself, but the rareness for the need of a surgical attack on it. He points out that surgery is indicated for the following reasons: mechanical—giving rise to symptoms from local stasis in the diverticulum or from partial obstruction to the biliary tract, pancreatic ducts or duodenum; inflammatory—local diverticulitis, perforation, abscess and peritonitis or secondary inflammation of the biliary tract (jaundice), pancreas, duodenum and retroperitoneal tissues; and neoplastic changes. The results in all reported cases were at least 80 per cent successful. In 8 cases no follow-up was given. In 6 per cent the symptoms were not relieved. The mortality rate was 6 per cent.

ULCERATIVE COLITIS

Cave³¹ in a review of his experience with ulcerative colitis describes in detail his present method of performing permanent ileostomy. This leaves the proximal end of the ileum in the right lower quadrant, brought out through a modified McBurney incision. The distal segment, which becomes a mucous fistula, is brought out through a stab wound to the left of the midline just below the umbilicus. Cave says that this reduces the complications of ileostomy and simplifies the procedure of colectomy at a later date. This method may be valuable, since chemotherapy (with sulfanilguanidine²⁸) can be applied directly to the diseased bowel. This at least offers possibilities for further study, both in regard to relief of symptoms and in regard to the preparation of the colon for removal.

Stone³² reports a method of performing a collecting reservoir of terminal ileum just proximal to the ileostomy for the purpose of decreasing the constant discharge of liquid contents. He used this procedure in 3 cases and was pleased with the results, since much of the fluid content was

absorbed from the pouch, thus producing a thicker and more easily managed ileostomy discharge.

McKittrick³³ has found that the preoperative use of the Miller-Abbott tube greatly facilitates colectomy in these cases. The small intestine becomes fluted on the tube, and so perfectly collapsed that it is easily kept out of the way during the removal of the colon.

IRRADIATION BURNS OF THE INTESTINE

White³⁴ reports 7 cases in which serious secondary involvement of the colon and ileum followed heavy radiation in the treatment of carcinoma of the cervix. 'This reaction has often been noted in mild degree, but in some cases such severe contraction of the intestine takes place that obstruction occurs. Fibrosis and ulceration are associated with bleeding and perforation. Temporary colostomy may be all that is needed in some cases of moderate severity, but permanent colostomy or resection is needed to relieve the more advanced lesions. White points out that the situation is probably far commoner than is recognized, and believes that often the symptoms are explained on the basis of a hopeless recurrence of the original disease, whereas as a matter of fact many such patients may be rescued by a proper surgical attack. Jones³⁵ and Todd³⁶ also call attention to rectal and intestinal complications following radiation for pelvic malignancy. Meigs³⁷ has had a similar experience.

CARCINOMA OF THE COLON AND RECTUM

Whipple³⁸ reports some striking results in surgery of the large bowel with the preoperative and postoperative use of the Miller-Abbott tube. In 76 cases of colon and rectal resections for carcinoma in various regions and by selective methods without the use of the Miller-Abbott tube there were 14 deaths, a mortality of 18 per cent. In 36 similar cases treated surgically in the same manner but with the use of the Miller-Abbott tube there was 1 death, a mortality of 3 per cent. Whipple thinks that the tube may replace any need for the two-stage operations in right colectomy but that, although it is valuable in the management of lesions of the left colon and rectum, it does not eliminate the need of colectomy.

Whipple points out the importance of having two members of the resident staff, a roentgenologist and a graduate nurse assigned to special duty for the introduction and management of the Miller-Abbott tube in large clinics. This is certainly advantageous in the formative period. As experience in this field accumulates, the difficulties and limitations of its use are becoming rapidly established. Ogilvie³⁹ has made an excellent report from Guy's Hospital on this subject. In my

opinion, it ranks second only to chemotherapy as the outstanding contribution to surgery during the past five years.

Coller, Kay and MacIntyre⁴⁰ have studied a group of specimens of rectal carcinoma clarified by the method used by Gilchrist and David.⁴¹ They found lymph-node involvement in 64 per cent of the cases studied, invasion of the blood vessels in 15 per cent. The age of the patient, the duration of symptoms, the size of the tumor and the size of the lymph nodes were unrelated to operability or to the lymph-node involvement and therefore to the prognosis. Anterior-wall lesions were more apt to reveal metastases. Only lesions within 3 cm. of the mucocutaneous junction showed lateral metastases. Above this region the spread of the disease was invariably upward or proximal to the lesion. Infiltrations through the wall of the bowel were accompanied by 91 per cent nodal involvement, whereas those confined to the wall showed 43 per cent metastatic nodes. Metastases were found in 81 per cent of sessile, 54 per cent of polypoid, and 33 per cent of excavating neoplasms. So far as could be determined, 28 per cent of all rectal carcinomas developed in polyps, and in another 42 per cent of the specimens benign polyps were also present.

LIVER

Ravdin⁴² presents experimental and clinical evidence that the liver may be protected from the damage inflicted on it by anesthesia and the other effects of any surgical procedure. He points out that carbohydrate is in itself insufficient, since its action is transient and the capacity of the liver cells for this substance is limited. Protein, on the other hand, is stored to better advantage and is utilized for liver-cell protection in a satisfactory manner. He suggests that the preoperative diet should contain approximately 70 per cent carbohydrate, 25 per cent protein and 5 per cent fat to obtain the maximum protection against liver damage.

Corriden⁴³ reports a successful operative procedure for extensive intracapsular hemorrhage of the liver. Confronted with a large bleeding cavity, he quickly detached the rectus muscle and filled the crater with it, holding it in place by loose sutures. The convalescence was stormy, but recovery took place.

Wallace⁴⁴ reports the successful removal of a large hepatoma involving a portion of the right lobe of the liver. The patient was symptom free after five years. He reviews the literature on the subject and brings it up to date.

PANCREAS

Morton and Widger⁴⁵ present an excellent paper

on the diagnosis and treatment of acute pancreatitis. They believe that there are three grades of this disease: the acute edematous, the hemorrhagic and the suppurative. Serum amylase determinations were more helpful than any symptoms, signs or other laboratory tests in establishing the diagnosis. Conservative treatment is advocated in all cases; in those which do not improve, operation may be beneficial. The operation should consist in biliary-tract drainage, the drainage of the abscess or necrotic area if it exists, but never incision of the pancreas itself. Unless an accurate diagnosis can be made, exploration is necessary to rule out a surgical emergency, such as perforation of peptic ulcer. In addition to the above, with which I agree, I should like to point out that persistent nausea in these cases may prevent adequate nourishment over too long a period. I have resorted to jejunostomy for feeding in these cases, with considerable satisfaction. Morton and Widger suggest that the pancreas is so like the parotid gland in structure that inflammation may respond to x-ray treatment in the former as it does in the latter. They have tried this form of therapy, giving only 250 to 450 r in broken doses of 50 to 100 r. Their early impression of this type of treatment is favorable.

David⁴⁶ reviews the literature and reports a case of his own of partial pancreatectomy for hypoglycemia. He concludes that in a patient with the Whipple⁴⁷ triad of symptoms (attacks of nervous or gastrointestinal disturbances coming on in a fasting state, associated with a hypoglycemia with readings below 50 mg. per 100 cc. and relieved immediately by ingestion of glucose), removal of the tail and body of the pancreas to the level of the superior mesenteric vessels is justifiable if careful search has failed to reveal an islet tumor. There was 1 death in 17 reported cases, and the results were satisfactory in 11. He questions the diagnosis in 2 of the remaining 4. The explanation of these good results is not clear, since hyperplasia of the islet cells was found in only 2 of the specimens. Normal pancreatic tissue was reported in 14 cases.

REFERENCES

1. Bartlett, R. W. Bilateral intercostal nerve block for upper abdominal surgery. *Surg., Gynec. & Obst.* 71:194-197, 1940.
2. Ogilvie, W. H. Cancer of the stomach. *Surg., Gynec. & Obst.* 68:295-305, 1939.
3. Whipple, A. O. Address of the president: the critical latent or lag period in the healing of wounds. *Ann. Surg.* 112:481-488, 1940.
4. Coller, F. A. and Valk, W. L. The delayed closure of contaminated wounds: preliminary report. *Ann. Surg.* 112:256-270, 1940.
5. Cutler, E. C. and Dunphy, J. E. The use of silk in infected wounds. *New Eng. J. Med.* 224:101-107, 1941.
6. Kelly, C. E. discussion of Cutler and Dunphy.⁵
7. Meade, W. H. and Ochsner, A. The relative value of catgut, silk, linen, and cotton as suture materials. *Surgery* 7:485-514, 1940.
8. Storck, A. H. Penetrating wounds of the abdomen: analysis of forty-six personal cases. *Surgery* 111:775-819, 1940.
9. Rippy, E. L. Perforating gunshot wounds of the abdomen. *J. A. M. A.* 115:1760-1765, 1940.
10. Warvi, W. N. and Orr, T. G. Internal supravescical hernias. *Surgery* 8:312-325, 1940.
11. Rienhoff, W. F., Jr. The use of the rectus fascia for closure of the lower or critical angle of the wound in the repair of inguinal hernia. *Surgery* 8:326-339, 1940.
12. Raddin, I. S., Rhoads, J. F. and Lockwood, J. S. The use of sulfanilamide in the treatment of peritonitis associated with appendicitis. *Ann. Surg.* 111:53-63, 1940.
13. Barrow, W. and Ochsner, A. Treatment of appendical peritonitis. *J. A. M. A.* 115:1246-1250, 1940.
14. Walters, W. Cardinal gastric ulcers: results of operation for apparently inaccessible lesions. *Arch. Surg.* 41:542-553, 1940.
15. McClure, R. D. and Fallis, L. S. Partial gastrectomy for peptic ulcer. *Surgery* 8:575-586, 1940.
16. Wangensteen, O. H., Varco, R. L., Hay, L., Walpole, S. and Trach, B. Gastric acidity before and after operative procedure with special reference to the role of the pylorus and antrum. *Ann. Surg.* 112:666-670, 1940.
17. Zollinger, R. Gastric resection with removal of the fundus in the treatment of duodenal ulcer. *Surgery* 8:79-93, 1940.
18. Hinton, J. W. and Maier, R. L. Chronic duodenal ulcer: procedures as determined by operative pathology. *Ann. Surg.* 111:348-354, 1940.
19. Allen, A. W. and Benedict, E. B. Acute massive hemorrhage from duodenal ulcer. *Ann. Surg.* 98:736-749, 1933.
20. Allen, A. W. Acute massive hemorrhage from the upper gastrointestinal tract. *Surgery* 2:713-731, 1937.
21. Wangensteen, O. H. The problem of surgical arrest of massive hemorrhage in duodenal ulcer: technique of closing duodenum. *Surgery* 8:275-288, 1940.
22. Finsterer, H. Surgical treatment of acute profuse gastric hemorrhages. *Surg., Gynec. & Obst.* 69:291-298, 1939.
23. Lahey, F. H. and Colcock, B. P. Diagnosis and surgical management of leiomyomata and leiomyosarcomata of the stomach. *Ann. Surg.* 112:671-686, 1940.
24. Ransom, H. K. and Kay, E. B. Abdominal neoplasms of neurogenic origin. *Ann. Surg.* 112:700-746, 1940.
25. Morton, J. J. discussion of Ransom and Kay.²⁴
26. Miller, R. H. personal communication.
27. Wangensteen, O. H. Aseptic gastric resection. *Surg., Gynec. & Obst.* 70:59-70, 1940.
28. Smithwick, R. unpublished data.
29. Trimble, I. R. personal communication.
30. Graham, R. The technique for total gastrectomy. *Surgery* 8:257-264, 1940.
31. Morton, J. J. Surgical treatment of primary duodenal diverticula. *Surgery* 8:265-274, 1940.
32. Cave, H. W. and Nickel, W. F. Ileostomy. *Ann. Surg.* 112:747-762, 1940.
33. Stone, H. B. discussion of Cave and Nickel.³²
34. McKittrick, L. S. personal communication.
35. White, W. C. Irradiation burn of the intestine. *Ann. Surg.* 112:769-774, 1940.
36. Jones, T. E. Intestinal complications resulting from prolonged radium and x-ray irradiation for malignant conditions of pelvic organs. *Am. J. Obst. & Gynec.* 29:309-316, 1935.
37. Todd, T. F. Rectal ulceration following irradiation treatment of carcinoma of the cervix uteri. *Surg., Gynec. & Obst.* 67:617-631, 1938.
38. Meigs, J. V. personal communication.
39. Whipple, A. O. The use of the Miller-Abbott tube in the surgery of the large bowel. *Surgery* 8:289-293, 1940.
40. Ogilvie, W. H. The late complications of abdominal war-wounds. *Lancet* 2:253-256, 1940.
41. Coller, F. A., Kay, E. B. and MacIntyre, R. S. Regional lymphatic metastasis of carcinoma of the rectum. *Surgery* 8:294-311, 1940.
42. Gilchrist, R. K. and David, V. C. Lymphatic spread of carcinoma of the rectum. *Ann. Surg.* 108:621-642, 1938.
43. Raddin, I. S. The protection of the liver from injury. *Surgery* 8:204-211, 1940.
44. Corriden, T. F. Subcapsular rupture of the liver in a child. *Surgery* 8:446-455, 1940.
45. Wallace, R. H. Resection of the liver for hepatoma. *Arch. Surg.* (in press).
46. Morton, J. J. and Widger, S. The diagnosis and treatment of acute pancreatitis. *Ann. Surg.* 111:851-863, 1940.
47. David, V. C. The indications and results of pancreatectomy for hypoglycemia. *Surgery* 8:212-224, 1940.
48. Whipple, A. O. and Frantz, V. K. Adenoma of islet cells with hyperinsulinism. *Ann. Surg.* 101:1299-1335, 1935.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE MORTEM AND POST MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, MD, *Editor*

CASE 2/41

PRESENTATION OF CASE

A sixty five year-old artist entered the hospital complaining of abdominal pain.

Because of the patient's condition the history was obtained from his wife and his physician. Three years before admission the patient had an attack of upper abdominal pain situated near the midline. This pain was constant, nonradiating, lasted four days and was unaccompanied by fever, chills, vomiting, jaundice or back or shoulder pain. The patient remained well until three days before admission, when he was seized at 3 p.m. with a moderately severe pain in the right upper quadrant of the abdomen, accompanied by vomiting and anorexia. His physician found tenderness with slight spasm in the right upper quadrant just beneath the costal margin. The pulse was regular, the blood pressure 150 systolic, 90 diastolic, the pain was considerably alleviated by morphine. The patient had a fairly comfortable night with the aid of sedatives. In the morning the pain was less severe, but there was marked nausea in addition to the vomiting, and he complained of a burning or sour sensation in the stomach. The temperature was 99.5°F, the pulse was still regular. One day before admission there was slight residual pain, but his physician noted that the heart rhythm was completely irregular. The patient was unable to sleep that night because of pain and discomfort, and early in the morning recalled his doctor. The patient had vomited once during the night, the vomitus was watery and contained no blood. Examination revealed absence of abdominal tenderness, but a marked pulse deficit, in addition to auricular fibrillation. The patient had had a bowel movement the morning of the day the attack of pain began, but none thereafter, although he was given an enema on the day before admission. Following the onset of the attack, he had had no appetite and had eaten practically nothing.

One brother had died of tuberculosis, and the family, as a whole, was said to be subject to "mild rheumatism." The patient had had no serious previous illnesses.

On examination the patient was pale, extremely obese, drowsy, but in no apparent distress. The pupils were small, but equal, and reacted only slightly to light. There was no jaundice. The heart was not enlarged to percussion, but was fibrillating rapidly, with a marked pulse deficit. No evidence of valvular disease, gallop rhythm or accentuation of the pulmonic second sound was detected. Examination of the lungs was negative. The abdomen was somewhat tense throughout, with no areas of definite tenderness, peristalsis was present. There was no peripheral edema.

The temperature was normal, the pulse 135, and the respirations 22.

Examination of the urine showed a ++ test for albumin. Examination of the blood showed a red-cell count of 4,600,000 with a hemoglobin of 16.1 gm (photoelectric cell technic), and a white cell count of 36,500 with 91 per cent polymorphonuclears. The nonprotein nitrogen of the blood serum was 28 mg per 100 cc; a blood Hinton test was negative.

X-ray films of the abdomen showed multiple stones, each about 1 cm in diameter, within the gall bladder. An electrocardiographic recording showed auricular fibrillation, with a rate of 140 to 150, the T waves were upright and of good amplitude, there was no abnormal axis deviation.

The patient was digitalized rapidly, and by the following day the ventricular rate had fallen to 115. Two days later the paroxysm of fibrillation had subsided, with the restoration of a regular rhythm at 88 per minute. The white cell count during this time swung between 14,000 and 22,000.

On the seventh hospital day an operation was performed.

DIFFERENTIAL DIAGNOSIS

DR HORATIO ROGERS: Are the x-rays pertinent?

DR AUBREY O. HAMPTON: These are apparently plain films of the gall bladder area. As the record stated the patient was very obese, and the films are therefore not so good as usual. The stones are obvious. The right side of the diaphragm is normal.

DR ROGERS: You cannot say anything about abnormal amounts of air in the intestines?

DR HAMPTON: The whole abdomen is not shown. One can see the region of the terminal ileum and ascending colon, which seems to be normal. There is a little gas in the terminal ileum, without dilatation.

DR ROGERS: The patient was sixty five and extremely obese, and in his past history he had had

one three-day episode of abdominal pain, which was not characteristic of gall-bladder disease or of duodenal ulcer, although it is said to have been in the upper abdomen. He was then well for three years and had an acute episode, which is very sparsely described. It started abruptly,—we may infer by the exactness of the hour,—with moderately severe pain accompanied by vomiting and anorexia, and the physician at that time noted nothing unusual about the pulse.

We then come to the admission to the hospital three days after the onset, when the patient was so sick that the history had to be taken from his wife and physician. He was drowsy but in no apparent distress. His pupils were small, but equal, and reacted only slightly to light. I suspect that morphine may have been part of the cause of his drowsiness. Later on, a nonprotein nitrogen determination showed that he was not in uremia. He presumably was not in diabetic coma, since there was no sugar in the urine; he must consequently have been very sick from his abdominal condition. But in spite of that the temperature was normal, although the white-cell count was 36,500 with 91 per cent polymorphonuclears. The abdomen was somewhat tense, but there were no areas of tenderness, and peristalsis was present. The patient did not have general peritonitis. His bowels had not moved, but he had eaten practically nothing since the onset. He had irregular fibrillation, and with digitalization, that subsided and a normal pulse returned. We are thus deprived of knowing what his pulse variations were during his preoperative hospital stay. An operation was then performed, apparently when he was somewhat better than he had been on admission.

There are a number of very interesting things about this case. To start with the most generalized considerations, the patient was relatively old, and he may have had cancer. If so, where would it be? Everything points to the right upper quadrant, and the only things that I can think of are the duodenum, the liver, the gall bladder, the bile ducts and the right colon. There is certainly nothing in the past history to suggest cancer. The episode three years previously does not fit in with cancer, in view of his subsequent good health. The abruptness of this recent episode, which brought the patient to the hospital, does not fit well with cancer unless we assume that a gradual occlusion had suddenly become complete. On the whole I do not believe that there is enough evidence to consider cancer very seriously.

The intestine might have been the cause of the trouble. The patient might have had a Richter's

hernia, either external or internal; but he was much too sick, and of course the story is not suggestive and there is not enough to consider that seriously. He might have had an appendiceal abscess, with a very high cecum. In people of sixty-five, particularly very obese people, the story and physical examination can be most obscure. He might have perforated his appendix at 3 p.m. without any prodromal symptoms that he could describe. Empyema of the gall bladder is also a possibility. We know that he had stones in his gall bladder, that he had some episode of upper abdominal pain three years before entry, and that this episode came on abruptly, as lodgment of a stone in the cystic duct might. The high white-cell count could be interpreted as evidence of undrained pus. The surgeons might not have felt the distended gall bladder because the patient was extremely obese. He had no jaundice, but he would not have had it if only the cystic duct had been obstructed, and that is all we can say for that.

The most striking disparity in this record is that between the white-cell count of 36,000 and the normal temperature. The likeliest explanation is a vascular accident. I can think of other things that could account for the high white-cell count and normal temperature—perhaps chemical peritonitis, perhaps certain neoplasms, perhaps a very sick or moribund patient who already had a leukocytosis but whose temperature had begun to go down with approaching death. On the whole some vascular accident seems likeliest in this man, who had a grossly abnormal vascular system. It is interesting that his abdominal symptoms began while his pulse was still regular. If he had had auricular fibrillation first, and then developed pain with this sequence of events, mesenteric thrombosis would be likelier, but that may be a minor point. Nothing is said about blood in the stools, because the patient did not have stools; he had no persistent tenderness, which I should expect if he had had mesenteric thrombosis. He did not have peritonitis enough to interfere with peristalsis. We have no x-ray evidence bearing on that. The distribution of the pain does not tell very much. It is simply under the costal margin. Nothing is said about radiation to the back. Nothing is said about the serum amylase; I assume it was not elevated, as it would be in pancreatitis.

It may not be quite fair, but one might ask what sort of operation was contemplated in a man in this condition, surely not any very radical or extensive surgery. Operation was performed with the idea of doing some small thing that was necessary, such as draining an empyema of the gall

bladder or relieving obstruction, rather than a resection for mesenteric thrombosis. If the patient did not need resection, the mesenteric thrombosis was best left alone.

Without more data I am merely guessing, but I hope I have at least mentioned what the condition really was. Either mesenteric thrombosis or empyema of the gall bladder seems probable, and I shall guess the latter.

DR. GRANTLEY W. TAYLOR: I think it would be interesting to have something on record indicating why operation was performed. We have his essentially negative physical examination, and in the laboratory work-up all we have is an elevated white cell count.

DR. TRACY B. MALLORY: Can you give any additional information, Dr. Welch?

DR. CLAUDE E. WELCH: I am the person alluded to as "the physician" in this case. I saw the man from the beginning through to the end, and although Dr. Rogers does not have all the details as we had them, we followed exactly his train of thought. In the first place here was a heavy man, weighing 250 pounds before he was taken ill. Two other things about his course at home and in the hospital seemed of importance. One, which Dr. Rogers has pointed out, was the extreme disparity between the white-cell count and the normal temperature, which persisted throughout. The second was the remarkable amount of pain, which the patient could not localize but nevertheless complained about bitterly, requiring large amounts of morphine. Physical examination throughout the stay in the hospital, as may be inferred from the notes, remained just about normal, with the exception of the finding, when he first came in, of definite tenderness and spasm in the right upper quadrant. During the first few days we considered that he probably had an acute gall bladder disease and that if we operated on him he would probably die; the latter turned out to be correct. We therefore treated him conservatively, despite the high white cell count, for nine days. As a matter of fact he was out of bed two days, and was apparently getting better. During that time an icteric index was taken, which was normal; Dr. Cope's laboratory reported a normal serum amylase. On the morning of the seventh day the patient suddenly had another severe attack of pain in the right upper quadrant and complained of increased pain, and again had spasm. Accordingly we believed that we were dealing with what had been acute gall bladder disease, which instead of subsiding had perforated. We decided that an emergency operation was indicated.

I think a little more discussion at this point might be pertinent.

DR. ROGERS: I should like to hear what his bowels did during the seven days.

DR. WELCH: He had had two or three small movements that were not abnormal. We were getting him out of bed, assuming he was well enough to go home, when the second episode happened.

DR. LELAND S. MCKITTRICK: Did he like food, or was it hard for him to eat?

DR. WELCH: He ate very little, and had no appetite.

DR. MCKITTRICK: I do not know what was the matter with him, but here and there in the story a number of things suggest pancreatitis, and I wonder how seriously it was considered. There are a number of things that are not quite right, it is true, but he had nausea and vomiting out of proportion to other things when the attack of pain came on. He had severe pain, but even when the pain was better he was uncomfortable and had nausea and vomiting. In other words, as I gather, he was quite uncomfortable in the hospital, at times without anything very definite to account for it. Dr. D. F. Jones used to lay a great deal of emphasis on indefinite, mild pain, persistent nausea and inability to eat, usually associated with deep tenderness along the course of the pancreas.

A PHYSICIAN: In the absence of pain in the back, how seriously would you consider pancreatitis?

DR. MCKITTRICK: Pain in the back may be important, but it is too often absent. To me it is of little or no help, and the diagnosis is frequently made without this symptom. The high white cell count without fever also suggests to me the possibility of pancreatitis.

DR. WELCH: We considered pancreatitis, but not seriously.

On opening the abdomen in the right upper quadrant no free fluid was found. The gall bladder was soft, contained stones, but was not acutely inflamed. When we lifted the transverse colon the pancreas could be felt; it was hard and enlarged one and a half times its normal size, with small areas of fat necrosis at the base of the transverse mesocolon. Accordingly, the gall bladder was emptied of stones, a drain put in, and the abdomen closed.

DR. MALLORY: Dr. Welch tells me that after operation the patient went along in much the same state for a few days, then had another extremely severe attack of pain and died very suddenly.

CLINICAL DIAGNOSES

Acute cholecystitis
Rupture of the gall bladder?

DR. ROGERS'S DIAGNOSIS

Empyema of the gall bladder?
Mesenteric thrombosis?

ANATOMICAL DIAGNOSES

Acute pancreatitis.
Chemical peritonitis.
Cholelithiasis.
Chronic cholecystitis.
Biliary cirrhosis of the liver, slight.
Rheumatic heart disease, with slight aortic and mitral stenosis.
Hypertrophy.
Obesity.

PATHOLOGICAL DISCUSSION

DR. MALLORY: At autopsy the chief finding was in the pancreas. At the time of operation it had been enlarged and hard; at the time of autopsy it was deliquescent. There was a mass of fluid, necrotic exudate, walled by chalky fat necrosis and a few recognizable remnants of pancreas. There was a slight diffuse chemical peritonitis. The heart was considerably hypertrophied, and showed mild chronic, rheumatic, mitral and aortic involvement. Microscopically the liver showed a trace of biliary cirrhosis.

DR. ROGERS: I am very glad Dr. McKittrick was here because otherwise the diagnosis would barely have been mentioned, certainly not discussed.

A PHYSICIAN: Should the serum amylase have given some help?

DR. WELCH: In this patient it was determined at a late stage of the disease, when it is often found to be normal.

CASE 27042

PRESENTATION OF CASE

A forty-nine-year-old Canadian housewife entered the hospital complaining of abdominal pain.

The patient had been perfectly well until eight months prior to entry, when, while doing some housework, she suddenly fainted and remained unconscious for about twenty minutes. After regaining consciousness she had a shaking chill for twenty minutes, followed by a sensation of warmth and diaphoresis. There were no other associated symptoms, and she remained well until two months later, when she had another severe chill, lasting for several hours, after which she had a drenching sweat. At this time she developed pain in the region of the umbilicus. The pain was rather sharp in character and rapidly increased in severity until it doubled her up; it gradually subsided in three or four minutes. These attacks recurred at irregular intervals, with varying severity, for about a week. During this period

the patient fainted five times. While suffering from pain she noticed a lumpy protrusion of her abdomen, which moved up and down and disappeared when the pain ceased. Her appetite was unimpaired, and there was no relation of the attacks to the ingestion of food. About four days after the onset of this episode, she had a sore throat for several days. She remained well thereafter until seven weeks before admission, and then began to have attacks of pain similar to those previously experienced. They still occurred in three-minute or four-minute cycles, but radiated from the umbilicus to the pubis and directly backward to the spine. The severity was generally increased, and the patient noted that "heavy" foods, particularly vegetables, appeared to aggravate the condition. There was never any nausea, emesis or melena, and her habitual constipation remained unchanged. She lost about 5 pounds during the eight months.

She had had mumps at twenty-two years of age, kidney trouble with the passage of "brick-dust" colored urine for five weeks at thirty-three, and diphtheria at thirty-five.

Physical examination showed a well-developed and well-nourished woman in no obvious distress. The heart was not enlarged. There was a soft systolic murmur at the apex. The blood pressure was 140 systolic, 80 diastolic. The lungs were clear. A visible swelling to the left of and below the umbilicus was caused by a firm, even, tender mass about the size of a baseball. There was an indefinite mass in the left upper quadrant, descending with respiration from beneath the costal margin. The liver edge was at the costal margin and appeared to be acutely tender. Considerable costovertebral tenderness was also elicited on the left. Vaginal examination showed a somewhat redundant anterior cervical lip. The cervix showed evidence of an old laceration, and there were many Nabothian cysts. The fundus was not definitely palpable, but the cervix moved on pressure beneath the abdominal mass. Rectal examination was negative.

The temperature, pulse and respirations were normal.

Examination of the urine was negative. The blood showed a red-cell count of 3,700,000 with a hemoglobin of 75 per cent, and a white-cell count of 7800 with 75 per cent polymorphonuclears. The stools gave a positive reaction to the guaiac test. The serum protein was 6.2 gm. per 100 cc.

A pyelogram showed both kidneys to be normal. A barium enema passed to the midpoint of the transverse colon, where complete obstruction was met. The obstructing defect corresponded to the palpable mass, which was readily movable but always with the transverse colon. There were ten-

derness and spasm in the right lower quadrant.

The patient remained comfortable after admission, although the temperature varied between 98 and 100°F., and the pulse between 80 and 90. Later examination showed the firm, round, tender mass previously noted, but none of the other abdominal findings were corroborated. On the fifth day an abdominal operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. ROBERT R. LINTON: We have in this case a forty-nine-year-old Canadian woman who was admitted to the hospital because of recurring attacks of unconsciousness, associated with severe chills on two occasions. The significance of these chills is rather difficult to determine, since we have no evidence that she had any fever with them, and the only temperature recordings we have are those of 98 and 100°F., after entry. The first attack of unconsciousness apparently was not associated with pain. The patient had five other attacks, however, that were apparently accompanied by severe abdominal pain. The note to the effect that she observed a lumpy protrusion of the abdomen, which moved up and down and disappeared when the pain ceased, is, I believe, of great importance in the diagnosis. It is rather strange that she apparently was well for a period beginning six months and ending seven weeks before admission, an interval of approximately four months. There is no question, however, that her symptoms became more marked in the last seven weeks before her admission, and her pains became more frequent. Of significance is the fact that the pain radiated from the umbilicus to the pubis and backward to the spine. Later she also observed that "heavy" food increased the pain, a thing which she had not noticed previously. In view of the x-ray findings, it seems extraordinary that her bowel habits remained unchanged. It is to be noted, however, that she is described as having been habitually constipated.

Physical examination is of interest because a mass was noted to the left and below the umbilicus. It was firm, even and tender, and about the size of a baseball. There was also a question of an indefinite mass in the left upper quadrant, descending with respiration. Pelvic examination was essentially negative. The fact that pressure beneath the abdominal mass produced movement of the cervix suggests to me that the abdominal mass was not connected to the uterus.

The laboratory studies are of importance in that they show a positive guaiac test in the stools. The blood counts show a secondary anemia, without leukocytosis.

There are a number of possibilities that enter my mind as explanations of these various symptoms and signs. In the first place, are we dealing with hyperinsulinism, that is, an adenoma of the islets of Langerhans, which of course could explain the symptoms of unconsciousness and also the severe chills? In answer to this, I believe the size of the abdominal mass and the fact that it was freely movable probably rule out this possibility.

Another condition that should be considered is that of cholelithiasis, with perforation of the gall bladder into the duodenum or colon and with a resulting obstruction of the bowel due to an impaction of a gallstone. I cannot rule out the diagnosis of cholelithiasis in this case, but it seems unlikely that the abdominal mass is due to an impacted gallstone in the intestines. In the first place, a gallstone usually becomes caught in the terminal ileum, and the fact that this patient's pain extended from the umbilicus to the pubis suggests that if she had intestinal obstruction, it was probably of the large bowel. In addition, she had no vomiting, a finding which is unusual in small-bowel obstruction.

Another possibility that enters my mind is an ovarian cyst with a twisted pedicle. The pelvic examination practically rules this out, and in addition the normal white-cell count hardly substantiates the diagnosis.

I think the most likely possibility is that this patient was suffering from some form of large-bowel obstruction. This is substantiated by the fact that she did have cramplike pains in her abdomen, which were chiefly felt below the umbilicus; this is characteristic of large-bowel pain. In addition, when she had the pain she noticed wavelike movements across her abdomen, which I interpret as intestinal peristalsis. The fact that she did not vomit suggests that her obstruction was in the large bowel and that it was only partial, which is also borne out by the fact that she was still having bowel movements. The positive guaiac reaction in her stools further bears out this diagnosis. It also indicates that we are probably dealing with a carcinoma which was ulcerating the bowel wall.

The x-ray studies give us additional information. A pyelogram of both kidneys showed that they were normal. The barium enema is of great significance in that it showed a complete obstruction of the transverse colon, which corresponded to the palpable mass in the abdomen. There was no evidence of displacement of the colon in the left upper quadrant, which probably rules out the presence of the indefinite mass in that region noted

on physical examination. The note made that after admission to the hospital, only the firm rounded mass was palpable also indicates this to be true.

In conclusion, my diagnosis in this case is carcinoma of the transverse colon, with almost complete obstruction. This does not explain satisfactorily to me the cause of the fainting spells and chills, but I do not see how it is possible to overlook the fact that by barium enema she had obstruction of the colon, or the fact that the mass felt in the abdomen was in direct relation to the point of obstruction. It is possible, I suppose, that the pains she suffered were severe enough to cause her to faint. I see no other way to explain them.

CLINICAL DIAGNOSIS

Carcinoma of hepatic flexure.

DR. LINTON'S DIAGNOSIS

Carcinoma of transverse colon.

ANATOMIC DIAGNOSIS

Lipoma of hepatic flexure.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: Diagnostic opinion on the wards closely paralleled the line of reasoning that Dr. Linton has set forth. There was speculation about the curiously intermittent character of the obstructive symptoms, but the x-ray report seemed to clinch the diagnosis of carcinoma of

the colon and the positive guaiac in the stools was cited as confirmatory evidence. The patient was therefore quickly prepared for operation and transferred to the surgical service.

On laparotomy Dr. Joe V. Meigs found a freely movable tumor in the hepatic flexure. The peritoneum was clear, but at one point the tumor seemed to have broken through the wall and to have marked the serosa. No doubt was felt that the lesion was carcinomatous, and a radical resection of the cecum, ascending colon and half the transverse colon was done with an anastomosis of the ileum to the transverse colon.

When the intestine was opened in the laboratory a pedunculated mass of tumor 6 by 4 by 4 cm. was discovered attached by a broad pedicle to the anterior wall of the hepatic flexure. The distal third of the tumor was greenish-black and obviously gangrenous. Beyond a sharp line of demarkation the remainder of the tumor was yellow and white, obviously consisting of a mixture of fatty and fibrous tissue. Microscopic examination confirmed the gross impression of a benign lipoma.

In retrospect, it is clear that the intermittent character of the obstruction was almost certainly due to attacks of intussusception, which are so frequent with polypoid tumors of the bowel. A lipoma would not, of course, be expected to produce a positive guaiac reaction, which was explained here by the partial gangrene of the tumor. Had the guaiac reaction been negative, the possibility of a benign tumor might have been more seriously considered.

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of
THE MASSACHUSETTS MEDICAL SOCIETY
THE NEW HAMPSHIRE MEDICAL SOCIETY

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SUBSCRIPTION TERMS \$6.00 per year in advance, postage paid, for the United States, Canada, \$7.04 per year, \$8.52 per year for all foreign countries belonging to the Postal Union.

MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

COMMUNITY FUND

This editorial is about money: how much or how little of it to give, and how to give it for a cause that is ours. This year the goal of the two hundred and twelve agencies covered by the Community Fund is \$4,883,000. The campaign started January 18 and will continue until February 5, during which time the Physicians' Group is expected to raise \$20,500. This figure seems small; yet it, like the larger one, represents an increase of 5 per cent over last year. Will physicians meet this challenge?

Perhaps we should examine the records of past campaigns to try to arrive at an answer. Last year for the first time the physicians did not quite meet their quota. The reason for this may not

be single, but it is a fact that the number of them with incomes sufficient to allow them to give several hundreds of dollars is steadily declining. This year the number is even smaller. From this it seems clear that one way to offset this loss is to "broaden the base" of the giving; that is, more people must give a little more. We can possibly improve our status by examining the scale adopted for the contributors in industry, a copy of which is in the hands of each committeeman. In brief, the person earning an average weekly wage of twenty dollars is expected to contribute five dollars to the Community Fund. Very often he does contribute this, as do a great number of doctors' secretaries. Few of us are financially able to put down in cash what we know is our fair share in supporting this vast program. But one should remember that the participating agencies receive their allotments in periodic payments. Why not, then, give accordingly throughout the year? A physician who hands the committeeman a five-dollar bill could as easily give that much each month. In fact, one is urged to budget one's gift in any way one sees fit. Furthermore, it may be allotted to any one of the two hundred and twelve agencies listed on the designation sheet.

This yearly campaign is planned, not for the collection of money, but for the gathering of pledges. Let us pledge in proportion as we value our citizenship in a healthful, wholesome and stable community.

THE PRESIDENT'S BIRTHDAY

INFANTILE paralysis was first recognized as a clinical entity just one hundred years ago, and in 1916 our section of the country was first visited by a major epidemic of the scourge. Over thirteen years ago the Georgia Warm Springs Foundation was established, largely through the instrumentality of Franklin D. Roosevelt, himself a victim of the disease, and on September 23, 1937, the National Foundation for Infantile Paralysis was sponsored by President Roosevelt. On January 3, 1938, the foundation was incorporated as a nonprofit membership corporation under the laws of New York State.

Although the foundation has been functioning for over three years, its first annual medical meeting was held in New York City on November 7 and 8, 1940, and the report of this meeting has recently been released by the foundation's president, Basil O'Connor.* The foundation now functions in two fields: first, through its local activities as carried on by over a thousand chapters covering more than thirteen hundred counties in the United States, carrying aid to afflicted persons, and secondly, through its national activities, consisting largely of grants-in-aid to various institutions, covering investigations in five divisions—virus research, nutritional research, after-effects research, epidemiologic study and education.

Some of the activities of the foundation are listed by Mr. O'Connor in his report. Chemotherapy, as well as biotherapy, is being studied; \$243,000 was granted to the field of virus research alone during the last three years. A grant of \$37,500 was made for a clinical nutrition study of infectious diseases in human beings. Through the After-Effects Committee, \$221,000 was granted to physiologists, chemists and orthopedic surgeons in laboratories and hospitals. Nearly \$100,000 was expended in emergency medical services, public education and epidemiological studies. Since its organization, \$1,554,000, or about 50 per cent of the funds raised, has been left with the chapters throughout the country for their local use.

The National Foundation for Infantile Paralysis is an amazing and thoroughly unique organization. Far from representing the financial generosity of a single man or a single family, or the studied investment of an industry, it really belongs to the common people who support it. It has been animated by the courage and zeal and enthusiasm of an individual, and to the country at large it must represent a triumph of unselfish devotion. It may well be ranked as a modern crusade.

The support of the foundation comes largely from the celebration of the President's birthday, which falls on January 30; a celebration that has been held annually since 1934, the proceeds of the

first four years going to the Georgia Warm Springs Foundation. The conquest of the virus diseases, of which infantile paralysis is one of the four horsemen, is a major medical problem facing us today. The National Foundation for Infantile Paralysis has proved its earnestness, its integrity, its worthiness. It deserves universal support.

PSYCHIATRY AND THE SELECTIVE SERVICE SYSTEM

World War I showed clearly the importance of excluding army recruits who showed signs of nervous or mental instability and hence were liable to be a burden instead of an asset and later to cause great expense to the country on account of hospitalization and compensation. Although methods for carrying out the preliminary examination of draftees in the last war left much to be desired, results of great value were obtained. The Selective Service System is at present faced with this same problem.

For the purpose of co-ordinating the work of the physicians who are dealing with the problem of mental and nervous stability the Selective Service System has arranged seminars where examining physicians of the local draft boards and psychiatrists of the medical-advisory and induction boards can meet together, discuss the problems, and come to some agreement about methods, standards and terminology.

The first regional seminar was held in Washington, D. C., on January 2 and 3. It was opened by Director Dykstra and was addressed in an evening session by the Honorable Paul V. McNutt. The second regional seminar, arranged for the New England area, is to be held in Boston on January 30 and 31, and the program appears in this issue of the *Journal*. It is hoped that all examining physicians, medical-advisory-board psychiatrists and induction-board psychiatrists from the New England states who are able to attend will do so. Members of the medical profession who are interested in nervous and mental disorders will be welcome at the seminars, and attendance at the evening meeting should prove profitable to those leaders in community activity who are particularly con-

*Annual Report of the National Foundation for Infantile Paralysis, Inc. 54 pp. New York: National Foundation for Infantile Paralysis, Inc., 1940.

cerned with mental hygiene, social organization and welfare, and problems of individual adjustment.

MEDICAL EPONYM

FRÖHLICH'S SYNDROME

On October 12, 1901, Dr. Alfred Fröhlich (b. 1871), an associate of Nothnagel in the First Medical Clinic in Vienna, gave a demonstration before the Society of Psychiatry and Neurology in Vienna. His discussion, including a case report and references to the literature, was published in the *Wiener Klinische Rundschau* (15: 883-886, 906-908, 1901), under the title "Ein Fall von Tumor der Hypophysis cerebri ohne Akromegalie [A Case of Tumor of the Hypophysis Cerebri without Acromegaly]." A portion of the translation follows:

I may repeat that in our case, along with the adiposity, other symptoms are present which make it seem apparent that these are to be regarded as trophic disturbances. Thus the scanty growth of hair, with loss of hair, the lack of hair in the axillae, the development of the breasts, the peculiar character of the pubis recalling the female genitals. . . . I have already spoken of the subjective sensation of chilliness and the dryness of the skin. Consequently there is present at least the suggestion of a myxedematous condition. . . . From these facts it may, therefore, be concluded that in the presence of symptoms suggesting a tumor in the region of the hypophysis and in the absence of acromegalic symptoms, the existence of trophic disturbances elsewhere, such as rapidly developing obesity or changes in the skin resembling myxedema, points to the hypophysis itself as the origin of the new growth.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

COMMITTEE OF ARRANGEMENTS

The Committee of Arrangements calls attention to the fact that space is still available for scientific exhibits at the next annual meeting of the Society.

Physicians or organizations considering the presentation of such displays should notify Dr. George P. Sturgis, 330 Dartmouth Street, Boston.

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

PREGNANCY IN A PATIENT WITH MITRAL STENOSIS

Mrs. M. C. W., a twenty-four-year-old para III at term, was admitted to the hospital on June 25, 1935, not in labor, with a diagnosis of rheumatic

heart disease, mitral stenosis and insufficiency, aortic insufficiency and cardiac decompensation.

The patient had had rheumatic fever in 1931, in the fifth month of her second pregnancy, and was confined to bed for about ten weeks. The pregnancy went to term, and during the last month the patient had dyspnea, orthopnea, palpitation and edema. Following a normal delivery in May, 1931, the patient was in such a poor condition that she was kept in bed in a hospital for forty-three weeks. She then returned home on limited exercise and digitalis. Her first pregnancy terminated in a normal delivery in June, 1929. Catamenia began at twelve, were regular with a twenty-eight-day cycle and lasted four days without pain. The last normal period began on October 5, 1934, making the expected date of confinement, July 12.

On her first visit to the prenatal clinic the patient was advised to go to the hospital. During the month prior to her admission she had numerous attacks of palpitation with dyspnea and orthopnea, without edema. Three weeks before admission the patient had an attack of palpitation lasting six hours. The patient was kept in bed during this time. There was no hemoptysis, cough, hoarseness, fainting spells, vertigo, scotomas or epigastric pain.

Physical examination at the time of admission showed a well-developed and well-nourished woman. The heart showed presystolic and systolic murmurs at the apex transmitted to the axilla. There was a diastolic murmur to the left of the sternum. The blood pressure was 160 systolic, 120 diastolic. The lungs were clear. There was edema of the ankles. The fundus was enlarged to a size consistent with the period of amenorrhea. The vertex was presenting in the pelvic brim, in an LOA position, and the fetal heart was audible.

Three days after admission the membranes were ruptured artificially. Following this, the patient had a few slight back pains. At midnight she was having an occasional contraction, but the cervix showed no change. At 1:12 a.m. 1 minim of Thyrophysin was given, and the patient started in good labor. The fetal heart at this time was somewhat rapid and irregular. When only a rim of cervix remained, drop-ether anesthesia, with oxygen, was started. The patient did not look well at this time, although the pulse was 80 and of good quality; and she soon became cold and clammy. The fetal heart could not be heard. Induction of anesthesia was very slow, deliberate and careful. Forceps were applied, and the head was delivered without traction. The baby was in very poor condition and required a great deal of resuscitation. It finally began to breathe fairly well but in a jerky manner.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

The mother's condition was satisfactory immediately following delivery, and she made an uneventful convalescence. The baby, however, died the day after delivery, and autopsy showed hemorrhage around the adrenal gland. The diagnosis was believed to be hemorrhagic disease of the newborn. The mother was discharged on July 21, obstetrically well with medical complications.

Comment. This patient was very severely ill. The method of delivery may well be criticized. The dictum that a cardiac patient should not have labor induced at any time for any reason is sound, and there was no very good reason for giving it up in this case.

The patient, having had cardiac decompensation, is classified as a Class 1A cardiac. In the first place, she should not have become pregnant; in the second place, she should have had her pregnancy terminated early, had she been seen at that time.

When first seen in the clinic, she showed early signs of decompensation. A much longer period of hospitalization before delivery would have been advisable.

When the patient again became pregnant, a therapeutic abortion was performed.

normality in the blood picture should be regarded with suspicion. Tests for sulfate excretion in the urine should also be made, according to the method of Yant, Schrenk, Sayers or others.

Q. I am plant physician for a small concern in which I suspect several men are exposed to harmful quantities of lead fumes. Where can I have the air analyzed to see how much lead is present, and where can I have urine samples examined to determine the amount of lead?

A. Your compensation-insurance carrier will probably do this for you; if not, the matter should be referred to your state department of industrial hygiene, provided it is equipped to make such examinations.

Q. Assuming that all precautions have been taken to prevent lead absorption, what method of examination should be used periodically on exposed employees?

A. In cases of moderate exposure, a routine examination of blood smears for stippling, a general physical examination and an examination of the urine for lead should be conducted quarterly.

Q. What is a safe procedure to use in the re-employment of a person with arrested tuberculosis?

A. Assuming that the tuberculosis has been arrested, the following conditions should hold on re-employment: careful, frequent check by x-ray and sputum examination; no exposure to dust; no strenuous exertion, particularly that involving stretching motions; adequate ventilation; and adequate rest.

Q. When should shop workers exposed to dust wear respirators?

A. Respirators should be worn when either siliceous or non-siliceous dust is present in large amounts. They should be used, however, as adjuncts to exhaust methods of dust removal, rather than as substitutes. Respirators are particularly necessary when the dust contains free silica (SiO_2) in amounts exceeding 1 per cent, which cannot be controlled by engineering methods.

Q. Please send me a list of simple approved respirators which can be used by workers in a moderately dusty atmosphere. The dusts are not specifically harmful, being of a vegetable nature.

A. Specific dust problems should be discussed with your state department of industrial hygiene.

COMMITTEE ON INDUSTRIAL HEALTH

QUESTIONS AND ANSWERS

Q. In one of our departments we are contemplating the installation of a large number of fluorescent lights. Some rumors are going around among the employees that exposure to these lights has an effect on the ovaries and may even cause sterility. Could you provide me with any information on this subject?

A. There is no more reason to anticipate harmful effects from this light than from other illuminants, such as tungsten filament lamps and Cooper-Hewitt mercury arcs.

Q. I am consultant to a plant in which large quantities of benzol are used in the manufacture of certain industrial chemicals. This benzol is normally kept in an entirely enclosed system, but there is some unavoidable inhalation of benzol vapor by maintenance and repair workers. There are reports in the literature of fatal cases of benzol poisoning in workers with very low-grade exposure to benzol. What steps should I take to make sure that no such cases occur?

A. Frequent examination should be made of those exposed to any concentration of benzol. Any ab-

where full and complete information as to the various types of respirators may be obtained

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning January 26

MIDDLESEX EAST

Tuesday, January 28, at 4 15 p.m., at the Melrose Hospital, Melrose Pediatric Case Discussions
Instructor R Cannon Eley Walter H Flanders,
Chairman

MIDDLESEX SOUTH

Tuesday, January 28, at 4 00 p.m. at the Cambridge Hospital, Mt. Auburn Street, Cambridge Diet and Vitamins in Surgery Instructor Charles C Lund Dudley Merrill, *Chairman*

NORFOLK

Thursday, January 30, at 8 30 p.m., at the Norwood Hospital, Norwood Technique and Treatment of Primary, Secondary and Tertiary Syphilis Instructor C Guy Lane Hugo B C Reiner,
Chairman

NORFOLK SOUTH

Monday, January 27, at 8 30 p.m., at the Quincy City Hospital, Quincy Recent Advances in Medical Therapeutics Instructor Charles A Janeway David L. Belding, *Chairman*

SUFFOLK

Thursday, January 30, at 4 30 p.m., in John Ware Hall, Boston Medical Library Chemotherapy in the Treatment of Gonococcal Infection Instructor Oscar F Cox Reginald Fitz, *Chairman*

DEATHS

DAVIS—CHARLES H DAVIS, M.D., of South Hamilton, died January 15 He was in his sixty ninth year

Born in Somerville, he attended Harvard University and received his degree from Harvard Medical School in 1899 He practiced in Beverly for four years, one of which he served as city physician He went to South Hamilton in 1905

Dr Davis was a fellow of the Massachusetts Medical Society and of the American Medical Association

His widow, a daughter and two sons survive him

DECKER—JOHN J DECKER, M.D., of Sioux City, Iowa, died December 18 He was in his thirty seventh year

He received his degree from the University of Wisconsin Medical School in 1931 and interned for one year at the Bell Memorial Hospital, Kansas City, Kansas From 1933 to 1938 he was assistant superintendent of the Lakeville State Sanatorium in Middleboro Dr Decker took a general surgery internship at the Carney Hospital from 1938 to 1939 For the fourteen months before his death, he was in general practice and surgery in Sioux City, Iowa

Dr Decker was a fellow of the Massachusetts Medical Society and of the American Medical Association

His widow and a daughter survive him

HENRY—JOHN G HENRY, M.D., of Winchendon, died January 18 He was in his eighty fourth year

He received his degree from Dartmouth Medical School in 1881 At the time of his death he was president of the Millers River Hospital, Winchendon Dr Henry was a fellow of the Massachusetts Medical Society and the American Medical Association He also held memberships in the New England Obstetrical and Gynecological Society and the American College of Surgeons

HUBBARD—OSWYN H HUBBARD, M.D., of Gilsun, New Hampshire, died January 5 He was in his eightieth year

Dr Hubbard received his degree from McGill University Faculty of Medicine in 1888 He was a member of the Massachusetts Medical Society and the American Medical Association

HUTCHINGS—J HENRY HUTCHINGS, M.D., of Woburn, died January 12 He was in his seventy ninth year

He attended Tufts College and received his degree from New York University Medical College in 1887 He interned at Charing Cross Hospital, London, and studied in Vienna before returning to begin practice here

Dr Hutchings was a fellow of the Massachusetts Medical Society and the American Medical Association

His widow survives him

KRAMER—FLORENCE KRAMER, M.D. of Lynn died at Miami Beach, Florida January 15 She was in her fifty-eighth year

Born in New York City, she received her degree from Loyola University School of Medicine in 1918 and first practiced surgery in the coalmining district of West Virginia

She was a member of the Massachusetts Medical Society and the American Medical Association and secretary of the North Shore Medical Society

Her widower, Dr Maurice Reingold survives her

MURPHY—EDWARD F MURPHY, M.D., of Jamaica Plain, died January 15 He was in his sixty fifth year

Born in St John, New Brunswick he received his degree from McGill University Faculty of Medicine in 1899 and was a member of the staff of the Royal Victoria Hospital, Montreal Since 1901 he had been in general practice in Boston, and during World War I was a captain in the medical corps

Dr Murphy was a fellow of the Massachusetts Medical Society and of the American Medical Association He was a former staff member of St Elizabeth's Hospital and at the time of his death was president of the Forest Hills Hospital He had been chief medical examiner for the law department of the City of Boston for the past ten years and was a member of the Massachusetts Society for Examining Physicians

His widow, a daughter, three brothers and two sisters survive him

WALTON—GEORGE L WALTON, M.D., of Boston died January 17 He was in his eighty-eighth year

Born in Lawrence, he attended Williston Seminary and Harvard University, and received his degree from the Harvard Medical School in 1880 The following three years were spent studying in Europe as a Parker Fellow in the Study of Neurology From 1900 to 1906 he was clinical instructor in the Department of Diseases of the Nervous System at Harvard Medical School Dr Walton had also served as physician and consulting physician to

the Neurological Department of the Massachusetts General Hospital.

He was a member of the Massachusetts Medical Society, the American Medical Association, the American Neurological Association and the Boston Society for Psychiatry and Neurology.

CORRESPONDENCE

MASSACHUSETTS STATE GUARD

A number of doctors are needed for duty as medical officers with the new Massachusetts State Guard which is now being formed. This volunteer organization will function in place of the Massachusetts National Guard, which is being inducted into federal service. It will be trained to cope with any emergency situation that might occur within the Commonwealth and which might overtax the capacities of civilian organizations.

A doctor, after receiving his commission, at the outset will have to devote a certain number of evenings to the examination of recruits, and thereafter will be expected to give one evening a week to drill, training and other routine duties. Full-time service will be required only in the event of some emergency, and will be limited to within the State.

The requirements of the physical examination are not strict. Previous military experience is desirable but not a necessary prerequisite. It is not expected that this duty will interfere materially with one's private practice. Any interested medical men will please communicate promptly with the undersigned, stating briefly their age, qualifications, and previous military experience, if any. Outside the Greater Boston area, there is need for one or more men in or near Brockton, Fall River, Framingham, Holyoke, Lawrence, Lynn, New Bedford, Pittsfield, Plymouth, Salem, Springfield and Worcester.

RICHARD H. MILLER, M.D., *Chief Surgeon*.

264 Beacon Street,
Boston.

DEPRIVATION OF LICENSE

To the Editor: At the meeting of the Board of Registration in Medicine held January 9, the Board canceled the registration as a practitioner of medicine in this commonwealth and revoked the certificate of registration of Dr. Daniel Nyman, 9 Jason Street, Arlington, Massachusetts, because of gross professional misconduct in connection with a case of abortion.

STEPHEN RUSHMORE, M.D., *Secretary*,
Board of Registration in Medicine.

State House,
Boston.

NOTICES

ANNOUNCEMENT

GERALD I. LICHTER, M.D., announces the removal of his office from the Boston City Hospital, Boston, to 1421 Main Street, Springfield.

BOSTON TUBERCULOSIS ASSOCIATION

The Boston Tuberculosis Association is holding its annual meeting at the Women's Republican Club, 46 Beacon Street, Boston, on Friday, January 31, at 4:30 p.m.

The meeting will be followed by a dinner at 6:15 p.m., attended by members and guests of the Southern Middlesex Health Association, Boston Tuberculosis Association,

Norfolk County Health Association, Newton Family Service Bureau, Cambridge Tuberculosis and Health Association, Essex County Health Association, Lawrence Tuberculosis League, Lowell Tuberculosis Association, Lynn Tuberculosis League, Malden Tuberculosis and Health Association, Salem Association for the Prevention of Tuberculosis, Southwestern Middlesex Public Health Association, Southern Worcester County Health Association, Massachusetts Tuberculosis League and the Trudeau Society of Boston. The after-dinner speaker will be Dr. Bruce H. Douglas, tuberculosis controller, Detroit Department of Health, whose subject is "Present-Day Problems in the Control of Tuberculosis."

MASSACHUSETTS GENERAL HOSPITAL

A meeting of the Hospital Research Council will be held in the White Auditorium of the Massachusetts General Hospital on Tuesday, January 28, at 5:00 p.m.

PROGRAM

Nutritional Factors in Obstructive Jaundice in Relation to Treatment. Dr. John D. Stewart and Miss G. Margaret Rourke.

Diagnostic Value of Synovial Fluid Analyses. Drs. Marian W. Ropes, Howard C. Coggeshall and Walter Bauer.

A Classification of the Various Types of Male Eunuchoidism from an Endocrine Point of View. Drs. Fuller Albright, Anne P. Forbes, R. Bretney Miller and Russell Frazer.

Dr. A. L. Watkins invites all who are interested visit the Department of Physical Therapy at 4:30 p. just before the meeting.

BOSTON DOCTORS' SYMPHONY ORCHESTRA



The Boston Doctors' Symphony Orchestra will rehearse under Alexander Thiede, formerly concert master of the Cleveland Symphony Orchestra, every Thursday at 8:30 p. Those interested in becoming members should communicate with Dr. Julius Loman, Pelham Hall Hotel, Brookline (BEA 2430).

BOSTON MEDICAL HISTORY CLUB

There will be a meeting of the Boston Medical History Club on Monday, January 27, at the Boston Medical Library, 8 Fenway, Boston, at 8:15 p.m. Dr. Harold F. Plough, Rufus Tyler Lincoln Professor of Biology, Amherst College, will speak on "Human Genetics in Relation to Medicine."

All interested persons are cordially invited to attend.

GREATER BOSTON MEDICAL SOCIETY

There will be a meeting of the Greater Boston Medical Society on Tuesday, February 4, in the auditorium of the Beth Israel Hospital at 8:15 p.m. Dr. David I. Macht, of Baltimore, Maryland, will speak on "Experimental and Therapeutic Researches on Snake Venoms." Discussion will follow by Drs. Hyman Morrison and Harry Blotner.

MASSACHUSETTS PSYCHIATRIC SOCIETY

There will be a meeting of the Massachusetts Psychiatric Society at the Boston Psychopathic Hospital on Friday, January 31, at 8 p.m.

PROGRAM

- The Evaluation of Intellectual Deterioration Dr David Shakow
 Procedures for the Study of Personality Through Educated Phantasies Dr S Rosenzweig
 Some Techniques for the Measurement of Psychophysiological Function. Dr E H Rodnick

TRUDEAU SOCIETY OF BOSTON

There will be a meeting of the Trudeau Society of Boston at the Beth Israel Hospital on Friday, January 31, at 8 p.m. Dr Bruce H Douglas, of Detroit, Michigan, will speak, his subject being "Methods in Tuberculosis Case Finding."

Physicians and students are cordially invited

HARVARD MEDICAL SOCIETY

The next meeting of the Harvard Medical Society will be held on Tuesday, January 28, in the amphitheater of the Peter Bent Brigham Hospital at 8 15 p.m. Dr Elliott C Cutler will preside.

PROGRAM

- Presentation of cases
 Carcinoma of the Pancreas Dr Frank Glenn, assistant professor of surgery, Cornell University Medical College.

JEWISH MEMORIAL HOSPITAL

There will be a staff meeting of the Jewish Memorial Hospital on Wednesday, January 29, in the hospital auditorium, 45 Townsend Street, Roxbury, at 8 30 p.m.

PROGRAM

- Recent Advances in the Treatment of Mental Diseases
 Dr Abraham Myerson
 Collation

All interested physicians are cordially invited to attend

CONSULTATION CLINIC FOR CRIPPLED CHILDREN IN MASSACHUSETTS, UNDER THE PROVISIONS OF THE SOCIAL SECURITY ACT

CLINIC	DATE	CLINIC CONSULTANT
Salem	February 3	Harold C Bean
Haverhill	February 5	William T Green
Lowell	February 7	Albert H Brewster
Gardner	February 11	Mark H Rogers
Brockton	February 13	George W Van Gorder
Pittsfield	February 17	Frank A Slowick
Northampton	February 19	Garry deN Hough, Jr
Fall River	February 24	Eugene A McCarthy
Hyannis	February 25	Paul L Norton
Worcester	February 28	John W O'Meara

NORFOLK DISTRICT MEDICAL SOCIETY

A regular meeting of the Norfolk District Medical Society will be held at the Carney Hospital, South Boston, on Tuesday, January 28, at 8 30 p.m.

PROGRAM

- Business
 Papers and case presentations by the hospital staff
 Discussion
 Collation

NEW ENGLAND PEDIATRIC SOCIETY

There will be a meeting of the New England Pediatric Society on Wednesday, January 29. The clinical presentation will be held in the amphitheater, Joseph H Pratt Diagnostic Hospital, and all other events at Longwood Towers, Brookline.

PROGRAM

- 4 00 Clinical meeting, Boston Floating Hospital Dr Elmer W Barron and his associates
 6 30 Refreshments
 7 00 Dinner
 8 00 Annual meeting of the society
 Election of officers
 Report of treasurer
 8 30 Pathologic Aspects of Adiposity Dr Sidney Farber

SELECTIVE SERVICE SYSTEM SEMINAR ON PSYCHIATRIC PROBLEMS

A seminar on psychiatric problems, arranged for the benefit of the examining physicians of the local draft boards and the psychiatrists of the medical advisory and induction boards, will be held in Boston on January 30 and 31. Dr Karl M Bowman, of New York City, will be the presiding chairman. The program is as follows:

JANUARY 30

Morning Session 10 30 a.m. Boston Medical Library

- Introduction Brigadier General Edgar C Erickson
 Remarks on the Medical Work of the Selective Service System Donald E Currier, M.D.
 Psychiatric Factors in the Medical Examination Joseph H Pratt M.D. professor of clinical medicine, Tufts College Medical School
 Military Psychiatry and the Selective Service System Lieutenant Colonel W C Porter
 Psychiatric Experience of the Veterans Administration Martin Cooley, M.D.

Afternoon Session 2 00 p.m. Boston Medical Library

- Practical Psychiatry Harry S Sullivan M.D.
 Informal discussion
 Synthesis of the discussion Dr Sullivan

Evening Session 8 30 p.m. Hotel Statler

- Dr W G Shippen, president, Massachusetts Medical Society, chairman
 National Defense and Selective Service Robert T Bushnell, attorney general of Massachusetts
 What the Medical Profession Expects from Psychiatry Lieutenant Colonel Elliott C Cutler, M.R.C.
 Selective Service and Psychiatric Issues C Macfie Campbell, M.D., medical director, Boston Psychopathic Hospital

JANUARY 31

(Each presentation will be followed by informal discussion by the panel of psychiatrists from the medical advisory boards and the induction boards.)

Morning Session, 9:30 a.m., Boston Medical Library

Peculiar Personalities: Mood disorders and psychopathic personalities. Karl M. Bowman, M.D., director of psychiatry, Bellevue Hospital, New York City.

Disorders with Structural Features: Mental defect and deficiency, posttraumatic encephalopathy, post-encephalitic changes, epilepsy and related states, and conditions associated with somatic disease and injury. Harry C. Solomon, M.D., associate professor of psychiatry, Harvard Medical School.

Psychosomatic Disorders. Abraham Myerson, M.D., clinical professor of psychiatry, Harvard Medical School.

Afternoon Session, 2:00 p.m., Boston Medical Library

The Psychoneuroses and Malingerings. Francis H. Sleeper, M.D., director of hospital inspection, Massachusetts Department of Mental Health.

Schizophrenic and Related Personalities. Douglas A. Thom, M.D., professor of psychiatry, Tufts College Medical School.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, JANUARY 26

SUNDAY, JANUARY 26

14 p.m. Medical Aids to Justice. Dr. Alan R. Moritz. Free public lecture. Harvard Medical School, Building D.

14 p.m. Orthopedics and the Layman. Dr. Robert H. Morris. Public health lecture. Cambridge Hospital, Margaret Jewett Hall.

MONDAY, JANUARY 27

12:15-1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.

*8:15 p.m. New England Heart Association. Peter Bent Brigham Hospital.

*8:15 p.m. Human Genetics in Relation to Medicine. Dr. Harold H. Plough. Boston Medical History Club. Boston Medical Library, 8 Fenway.

TUESDAY, JANUARY 28

*9-10 a.m. Clinic on Tumors of the Breast. Dr. W. M. Shedden. Joseph H. Pratt Diagnostic Hospital.

12:15-1:15 p.m. Clinicorontgenological conference. Peter Bent Brigham Hospital amphitheater.

5 p.m. Hospital Research Council. Massachusetts General Hospital, White auditorium.

8:15 p.m. Harvard Medical Society. Peter Bent Brigham Hospital amphitheater.

WEDNESDAY, JANUARY 29

*9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

*12 m. Clinicopathological conference. Children's Hospital.

*2-4 p.m. Endocrine Disorders. Drs. R. Loeb and E. C. Cutler. Peter Bent Brigham Hospital.

4-8:30 p.m. New England Pediatric Society. Joseph H. Pratt Diagnostic Hospital and Longwood Towers, Brookline.

*8:30 p.m. Jewish Memorial Hospital, 45 Townsend Street, Roxbury.

THURSDAY, JANUARY 30

*8:30 a.m. Combined clinic of the medical, surgical, orthopedic and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital, at the Peter Bent Brigham Hospital.

*9-10 a.m. Sulfathiazole in Gonococcal Infections. Dr. O. F. Cox. Joseph H. Pratt Diagnostic Hospital.

Selective Service System Seminar. Boston Medical Library, 8 Fenway.

*5 p.m. Vitamin K: Its general significance in biochemistry, and its role in human pathology and its application in therapeutics. Dr. Henrik Dam. Cutter Lecture on Preventive Medicine. Harvard Medical School, amphitheater of Building E.

FRIDAY, JANUARY 31

*9-10 a.m. Clinicopathological conference. Drs. J. C. Aub and H. E. MacMahon. Joseph H. Pratt Diagnostic Hospital.

Selective Service System Seminar. Boston Medical Library, 8 Fenway.

4:30 p.m. Boston Tuberculosis Association. Women's Republican Club, 46 Beacon Street, Boston.

*8 p.m. Methods in Tuberculosis Case Finding. Dr. Bruce H. Douglas. Trudeau Society of Boston. Beth Israel Hospital.

8 p.m. Massachusetts Psychiatric Society. Boston Psychopathic Hospital.

*Open to the medical profession.

†Open to the public.

FEBRUARY 4 — Greater Boston Medical Society. Page 176.

FEBRUARY 5 — Wachuset Medical Society. Page 135, issue of January 16.

FEBRUARY 12 — New England Dermatological Society. Page 134, issue of January 16.

FEBRUARY 13 — Pentucket Association of Physicians. Page 263, issue of August 15.

FEBRUARY 20-22 — American Orthopsychiatric Association, Inc. Page 999, issue of December 12.

MARCH 8 — American Board of Ophthalmology. Page 201, issue of August 1.

MARCH 12-14 — New England Hospital Assembly. Hotel Statler, Boston.

MARCH 21-22 — New York University College of Medicine, Alumni Day. Page 135, issue of January 16.

APRIL 21-25 — American College of Physicians. Page 1065, issue of June 20.

MAY 21, 22 — Massachusetts Medical Society, Boston.

JUNE 2-6 — American Medical Association. Cleveland, Ohio.

OCTOBER 14-17 — American Public Health Association. Page 135, issue of January 16.

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

FEBRUARY 5 — Gastric and Duodenal Ulcer: Diagnosis and treatment. Dr. Arthur Allen. Lynn Hospital.

MARCH 5 — X-ray in Heart Disease. Dr. Merrill C. Sosman. Essex Sanatorium, Middleton.

APRIL 2 — Pediatric Problems in General Practice. Dr. Joseph Garland. Addison Gilbert Hospital, Gloucester.

MAY 14 — Relation of the Doctor to the Law. Mr. Leland Powers. New Ocean House, Swampscott.

FRANKLIN

MARCH 11.

MAY 13.

Meetings will be held at 11 a.m. at the Franklin County Hospital, Greenfield.

NORFOLK

JANUARY 28 — Carney Hospital. Page 177.

FEBRUARY 25 — Medicolegal meeting. 8:30 p.m. Hotel Puritan, Boston.

MARCH 25 — To be announced.

MAY 8 — Censors' meeting. Hotel Puritan.

SUFFOLK

JANUARY 29 — Page 604, issue of October 10.

APRIL 30 — Page 604, issue of October 10.

WORCESTER

FEBRUARY 12 — Worcester State Hospital, Worcester.

MARCH 12 — Memorial Hospital, Worcester.

APRIL 9 — Hahnemann Hospital, Worcester.

Supper at 6:30 p.m. followed by a business meeting and scientific program.

BOOK REVIEW

A Method of Anatomy, Descriptive and Deductive. By J. C. Boileau Grant, M.C., M.B., Ch.B., F.R.C.S. (Edin.). Second edition. 4°, cloth, 794 pp., with 651 illustrations. Baltimore: Williams & Wilkins Company, 1940. \$6.00.

This second edition, much improved by new textual discussions and by one hundred additional illustrations, should make a strong appeal to students. The author presents his subject in a stimulating manner, well calculated to stir the imagination and the interest of his readers. Mutual relations of facts and their correlation with clinical data constitute an important aspect of the book. Those who are familiar with the first edition will want to own a copy of the new one.

The New England Journal of Medicine

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VOLUME 224

JANUARY 30, 1941

NUMBER 5

EXPLORATION AND DIVISION OF THE FEMORAL AND ILIAC VEINS IN THE TREATMENT OF THROMBOPHLEBITIS OF THE LEG*

JOHN HOMANS, M.D.†

BOSTON

EXPLORATION of the femoral and iliac veins has been found useful in treating some of the varieties of thrombophlebitis peculiar to the leg. As in other comparatively untried procedures, its indications are not as yet clear. The radical surgeon will use it too often; the conservative, too seldom. Its principal indication is undoubtedly to prevent pulmonary embolism, but it may be called for to correct peripheral vasospasm in the limb served by the diseased vein, to oppose recurrence of attacks of femoroiliac thrombophlebitis and, conceivably, once the femoral vein has suffered destruction of its valves by earlier attacks, to prevent backflow down the vein, the same purpose for which a varicose vein is divided at the groin. No other indications, however, can compare in importance with preventing the detachment of an embolus. And the most frequent source of embolism, in my opinion, is the so-called "bland" type of thrombosis, especially the sort that originates in the deep veins below the knee.

THROMBOPHLEBITIS IN THE DEEP VEINS OF THE LOWER LEG

Occurring During Active Life

In 1934, I¹ read a paper before this society on "Thrombosis of the Deep Veins of the Lower Leg, Causing Pulmonary Embolism," based on four cases, in one of which (A.F., 1929) I successfully divided the superficial femoral vein at the groin. This operation was performed at the request of Dr. Channing Frothingham, who had seen another of his patients die, without operation, under exactly similar conditions of disease. Since that time, I have treated five other patients, not one of whom has suffered a pulmonary embolism, and two of whom I have operated on with

success. For the sake of clarity, let it be understood that I am alluding, for the moment, only to thrombophlebitis in the deep veins of the calf, occurring during active life; that pulmonary embolism has been held in each case to be threatened; that treatment has been directed principally against that accident; that the patients were young or middle-aged, and free from antecedent disease; and that the diagnosis rests on the following findings: the patient experiences lameness on walking, especially when going up or down stairs; such swelling and cyanosis as are present are confined to the lower leg, that is, entirely below the thigh; there is no generalized edema as in phlegmasia alba dolens; the *dorsiflexion sign*—discomfort behind the knee on forced dorsiflexion of the foot—is *positive*; swelling and cyanosis are always relieved by a few days' rest in bed (in contrast to femoroiliac thrombophlebitis), and in several cases, ineffectually treated, have recurred more than once.

The treatment consists of rest in bed, the foot of which is elevated from 10 to 15 cm. The leg is sometimes placed on a small, soft pillow for comfort, but is otherwise left free. The active venous return so secured is believed to limit the progress of thrombosis and to lead to healing. The swelling and cyanosis, if any, always disappear in a few days, but the dorsiflexion sign usually lasts for a week or more. At the end of ten days, all signs of disease having gone, the leg is actively used in bed, the foot being exercised first, then the knee and thigh, as in riding a bicycle. After four days of this treatment the leg is bandaged from toes to knee with semielastic cotton bandage, and the patient begins to walk. If none of the original signs recur, he is allowed, about three weeks from the time he went to bed, to resume a full, active existence.

If, on the other hand, when the patient first gets up, the discomfort, edema and especially the

*Presented at the annual meeting of the New England Surgical Society, Poland Spring, Maine, September 28, 1940.

†Clinical professor of surgery, Tufts College Medical School; chief of Circulatory Clinic, Boston Dispensary.

dorsiflexion sign reappear, the superficial femoral vein is at once exposed and divided. Operation is recommended also when the patient, before being seen, has already undergone several episodes of bed rest and relapse.

A case in point, fairly representative of the three that I have treated by operation, is the following:

S. G., a healthy 18-year-old college girl, had recently driven an automobile across the continent. On arriving, she felt her right leg to be lame, and after a day or two I found her ankle to be slightly swollen, the foot faintly cyanotic. The dorsiflexion sign was strongly positive. After 2 weeks of treatment by elevation of the leg in bed, she seemed to have fully recovered and was allowed gradually to get about in a semielastic cotton bandage. Almost at once, however, the lameness and swelling reappeared and discomfort on dorsiflexion recurred. Accordingly, the superficial femoral vein at the groin was explored, was found to contain no clot at this level and was divided. After a week in bed and a second week of convalescence, the girl was able to ignore the leg, which never again exhibited lameness or swelling.

Thus the division, primarily intended to forestall embolism, rapidly and permanently relieved the patient of all signs of the disease. Such an optimistic statement is justified by exactly similar results in two other cases, one, a woman of thirty-five, the other, an athletic man of forty-five. It will be understood, of course, that three other patients recovered completely, without operation, under the scheme of treatment outlined.

All this I¹⁻³ have already described in other writings. Accordingly, I go on to another and more difficult phase of thrombosis of the deep veins of the lower leg, namely, that which occurs during an illness, or postoperatively, or in the course of life in bed enforced by any posttraumatic state. Under these conditions, the patient being already horizontal and the femoral and iliac veins being unobstructed, *no swelling or cyanosis occurs*, and pain below the knee is slight or altogether absent.

Occurring During Life In Bed

Since thrombophlebitis occurring during life in bed causes few and unreliable subjective signs, it is often unnoticed until an embolism occurs. A sufficiently typical case will serve to describe it.

M. A. H., a 54-year-old woman, was operated on for gallstones and chronic cholecystitis. The operation and early days of convalescence were as uneventful as possible, but on the morning of the 8th day the patient complained of extreme shortness of breath and pain in the midchest. From this attack she recovered in the course of the day, the electrocardiogram showing no sign of coronary infarction.

Both lower limbs appeared completely normal: there was no cyanosis or swelling, and no tenderness. However, forced dorsiflexion of the feet brought out a *slight but* distinct discomfort in the back of the right upper calf. This was taken to be sufficient evidence of a deep throm-

bosis in some of the great venous plexuses of the calf—short perhaps of a venogram, which appeared dangerous under the circumstances.

Exploration of the femoral vein was made after the method presently to be described. When exposed, the superficial and common femoral veins appeared normal, but when the superficial femoral vein was opened, just distal to the profunda, there was found floating in the current the free proximal end of a thrombus, whose attachment must have been to a vessel in the upper calf or popliteal space. The upper part of this soft thrombus, from which the recent embolus is presumed to have broken, was sucked out, and the vein divided between ligatures. The patient made an uneventful recovery. The leg gave no trouble during convalescence or afterward.

That this sort of accident is not unusual requires no proof, although a warning embolism causing infarction does not by any means regularly precede the fatal breaking off of the long propagating thrombus. However, it is of some interest that, subsequently, this woman's brother, while under treatment for a neglected appendicitis, died of a pulmonary embolism. The autopsy disclosed the parent thrombosis in a plexus of veins between the gastrocnemius and soleus muscles, and a study of the lungs showed that a pulmonary infarction had preceded the fatal embolism. Possibly, a more suspicious and watchful attitude might have identified the warning infarct and even called attention to the guilty leg.

NONOBSTRUCTING BLAND THROMBOSIS IN THE UPPER FEMORAL AND ILIAC VEINS

Outspoken phlegmasia alba dolens, that is, the common milk-leg type of thrombophlebitis, is not the subject of these remarks. This disease fully occludes the great veins draining the leg, causes a considerable degree of edema, and if it were not a rather common cause of arterial or peripheral vasospasm and of disabling postphlebotic disorders, would be of little surgical interest. It is rather the nonobstructing thrombosis, forming the soft thrombus which sometimes fills the femoral and iliac veins, even floating up into the vena cava, that is in question here. In recent years, several German and French surgeons (Kulenkampff,⁴ Fründ,⁵ Låwen,⁶ Leriche⁷) have attacked such disorders without exactly defining them. But Låwen,^{8,9} in particular, distinguishes between bland thrombosis and an outspoken thrombophlebitis, the same distinction that I am making here. I think it probable that most of these processes originate in the lower leg—recent observations of Frykholm¹⁰ and others strongly support this contention—and that bland, nonobstructing femoral thrombosis has usually ascended from that region,* adhering to the vein here and there, and filling it loosely, without actually blocking it.

*In one case I actually watched a typical lower-leg deep thrombus, causing no swelling but a positive dorsiflexion sign, jump, as it were, and fully obstruct the upper femoral vein, producing swelling of the entire leg.

Such a thrombosis often, though not always, calls attention to the limb, even during life in bed, by some swelling and cyanosis below the knee. It is a source of repeated embolism, which ends, as a rule, in death. Pieces break off in the external or common iliac vein, until a considerable mass accumulates in the pulmonary vessels or until the detachment of an especially large mass ends the patient's life. Sometimes the process is bilateral, moderate swelling and blueness appearing only at one ankle, although quite as much thrombosis is present in the deep veins of the opposite limb.

Although both French and German surgeons have purposefully removed detachable thrombi from the common femoral and external iliac veins, —usually through an opening in the superficial femoral at the groin,—my own early experience followed the direction of an attempt to shut off the current and cause the process to become organized, until Dr. Arthur W. Allen demonstrated that through an opening in the common femoral vein, a huge mass of clot could be sucked out and the great veins safely cleared of thrombosed and clotted blood. I believe that in the future, instead of at once dividing the various femoral veins as he did, it might be permissible to repair the vein and institute for the next few days a vigorous heparinization. This step should safely restore, at least for the time being, the venous pathways, but whether it might not lead to a recurrence in the distant future is uncertain. At least, repair without division has safely been used* even before heparin was available.

The femoral vein at the groin should, then, be explored when, following a nonfatal embolism, evidence is secured that a nonobstructing or only partially obstructing thrombosis is present in the femoral and iliac veins. Through an opening in the superficial or perhaps the common femoral vein, the proximal and some of the distal part of the thrombus can be sucked out, and the accessible veins repaired or divided. Such a procedure is probably, in skilled hands, less hazardous than nonoperative treatment. I hardly dare put the matter more strongly.

EXPLORATION OF THE FEMORAL VEIN

The vessel may be approached by way of a long, oblique incision, parallel to the inguinal ligament (my own preference) or by a longitudinal incision, which must cross the ligament and be carried up on the abdominal wall.

The pulsation in the femoral artery is the guide to the situation of the vein, which lies medial to

it; and the saphenous vein, which should at first be preserved, leads the operator to the femoral vein itself. The soft tissues just lateral to the saphenous opening should be treated with respect, since they contain the lymph nodes so often inflamed in association with thrombosing processes in the leg.

Having demonstrated the saphenous opening and cleared the fascia lata below it, downward for 6 or 7 cm. and for perhaps 2 or 3 cm. above, one can easily expose a considerable stretch of the femoral vein. The vein and its branches must now be freed, so that short lengths of small, soft rubber tubing can be passed, respectively, about the common femoral vein above, the superficial femoral vein below, the profunda vein behind and the great saphenous vein in front. Since it is impossible to identify any but the most solid thrombus within the vein, the superficial femoral vein should now be incised longitudinally. The tubes control the bleeding.

Should an altogether loose clot be found, it is best sucked out. Good-sized glass tubing, having a smooth end, will do, but Dr. Allen demonstrated to me a good use for the Trendelenburg suction tube and reservoir, although it may be too large for the superficial femoral vein. What should one do if the thrombus seems rather adherent? The conservative surgeon will merely divide every vein and withdraw, as I have done.† The more radical surgeon will vigorously suck out the adherent thrombus, as I should feel justified in doing. He may then ligate and divide all veins or repair the opening in the femoral vein and heparinize the patient. During the convalescence, which, in case of division, may be attended by considerable edema and cyanosis of the leg, the foot of the bed should be raised 10 to 15 cm. above the head, and the leg left free for exercise. It should be recognized that whereas division of the superficial femoral vein for thrombosis confined to some group of deep veins below the knee is attended by little or no edema and cyanosis, the situation when the whole femoral system is occupied is very different; collateral pathways are perhaps involved, and division may cause serious edema.

EXPLORATION AND DIVISION OF THE FEMORAL AND ILIAC VEINS

For Recurrent Embolism

Recurrent embolisms are commoner than one would suppose. I have recently encountered four such cases. They are likely to be picked up by the cardiologist, since they are readily mistaken

*In 1926, Bazy¹¹ removed a soft thrombus from the axillary vein, which he reported, in a case of *thrombose par effort*. Edema soon receded, and the patient recovered. Other similar experiences have been recorded, and many, perhaps, have never been published. But fatalities as well have occurred (see discussion of Kutenkampff's¹² communication).

†In one such case, embolism recurred, and I was finally obliged to divide the common iliac vein, embolism ceased, and the leg has become functionally useful.

for cases of myocardial infarction due to coronary disease. A study of the problem of repeated embolism is a fascinating one, and I² have already

dolens, which, though of itself an uncommon source of embolism, may lead to a local recurrent thrombosis and subsequent embolism; a previous

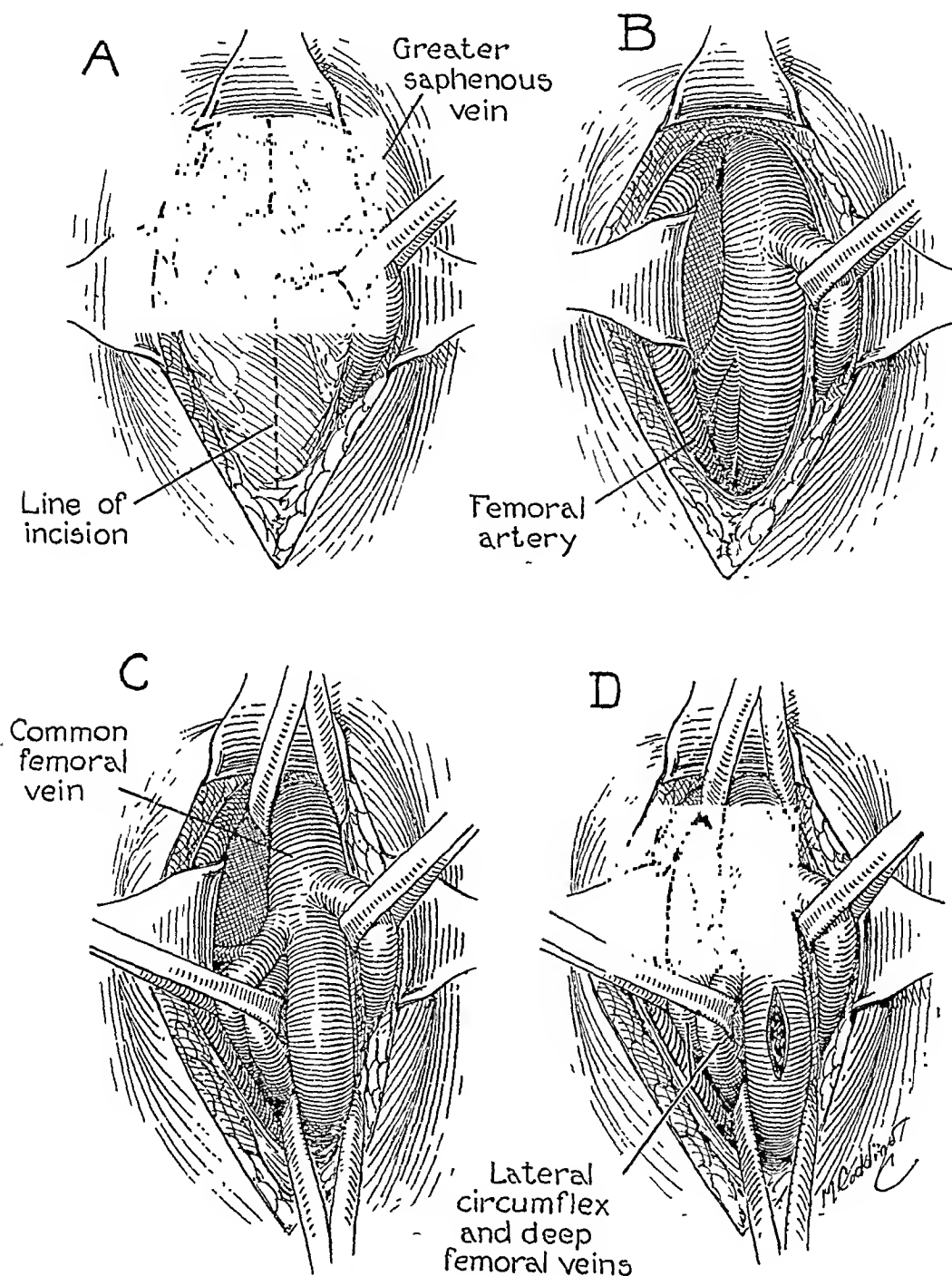


FIGURE 1. *Semidiagrammatic Sketch Demonstrating Exploration of the Right Femoral Vein.*

A. Incision at the groin exposing the saphenous opening; site of incision of deep fascia.
 B. The common femoral vein and its branches; the femoral artery is retracted laterally.
 C. Soft tubing is placed around the various veins. D. As the tightened tubes control bleeding, the superficial vein is opened, revealing a thrombus.

published the details of a number of these cases.

The history is most important. Is there a story consistent with an earlier thrombophlebitis? This may take the form of a typical phlegmasia alba

nonobstructing thrombosis in the lower leg or higher, associated with embolism; or a superficial thrombophlebitis, in the saphenous system, for instance, perhaps in a varicose vein, from which

small emboli may have been detached, or which may have extruded a propagating thrombus into the femoral.

It is in running down an earlier thrombophlebitis that a venogram may be remarkably useful (Dougherty and Homans¹²). It may be possible to show that the femoral vein is of irregular caliber and without valves, owing to previous disease. In a case of this sort—that of a man condemned to invalidism because of supposed coronary disease—I found, on transperitoneal exploration, the left external iliac vein adherent to the artery and partly filled with fibrous ribbons left by canalization of the old process. Division of the vein has for over two years prevented recurrence of the former minor embolisms.

In other cases, following a story of old thrombosis and embolism, it has seemed best to operate immediately after the most recent episode, provided the same leg as before has clearly been affected, since, at this moment, exploration of the femoral region may demonstrate, more accurately than at any other time, the situation of the process. For example, exploration may reveal that this is and has been altogether below the groin, or perhaps in the great saphenous vein. If sclerosis and adhesion of the common femoral vein behind the inguinal ligament show that the process has extended higher, the choice is given of dividing the superficial femoral vein, on the ground that blocking this now valveless and sclerosed vessel will prevent further recurrence of the thrombosis, or of exploring retroperitoneally or transperitoneally the iliac veins and dividing the external or common iliac vein. I can only hint at some of the possibilities in this fascinating field. The most satisfactory aspect of proximal division to forestall further embolism is that such division appears to have a favorable effect on the peripheral circulation; that is, a collateral circulation having already been established, little cyanosis or additional swelling follows. The foot is apt to feel warmer, and the leg is afterward the source of fewer discomforts. This favorable effect may be due to the prevention of reflexly excited vasospasm and to the relief of back pressure in a valveless vein. To say that in any one case the operation has guaranteed the patient against embolism is, of course, unjustified, even after the flight of considerable time.

To Relieve Local Arterial Or Peripheral Vasospasm

Exploration to relieve vasospasm is, of course, a field as to which little is known. Actually, any one of three types of vasospasm may be associated with a femoroiliac thrombophlebitis. The first is the diffuse peripheral type, thought to occur principally in the venules just beyond the capillary

bed; this is believed to be an important cause of the edema of phlegmasia alba dolens, and according to Leriche and Geisendorf,¹³ Ochsner and DeBakey^{14,15} and others, is relieved by sympathetic lumbar procaine block. I am inclined to agree that lumbar block does in some degree release such vasospasm. In any case, exploration is not demanded.

The second variety of vasospasm is represented by a sudden constriction of the great artery accompanying the thrombosed vein. This is a rare event, but serious. It shuts off, or nearly shuts off, the arterial supply to the limb, and may actually lead to gangrene. Explorations have disclosed the contracted, threadlike artery but have accomplished little. I myself have seen such spasm disappear after an effective lumbar sympathetic block. It is quite capable of relaxing spontaneously—and unpredictably.

The third variety is the late, diffuse peripheral spasm, related to the early acute type, which may remain for years after an initial femoroiliac thrombophlebitis has subsided. This is probably due to fibrosis of the wall of the great vein and to an irritation of perivascular nerves, sensory or vasomotor or both. Its effect is causalgia-like; that is, the limb is slightly cyanotic, edematous and oversensitive to pinprick and pressure. Confirmation of a tentative diagnosis is secured by noting the immediate temporary relief obtained by a lumbar sympathetic procaine block. Such an effect may even, in mild cases, be prolonged by repeated lumbar injections until it has become a cure. Sympathectomy relieves with even more certainty, but there may also be an advantage in dissecting apart the great iliac and femoral vessels and even in dividing the great vein. This is Leriche's particular contribution. Naturally, the operation requires considerable skill and familiarity with the handling of large blood vessels. I believe that the right iliac vessels should be approached extraperitoneally; the left, transperitoneally.

DIVISION OF THE FEMORAL OR ILIAC VEINS FOLLOWING AN OLD THROMBOPHLEBITIS TO PREVENT BACKFLOW

I have several times remarked on the apparent harmlessness and even benefit to the circulation of high division of such femoral or iliac veins as have previously been the seat of thrombophlebitis. I hardly care to go farther into this subject here. Obviously, the femoral system, once thrombosed, must suffer the loss of all its valves (there is rarely one in the external iliac vein and none above), so that when the body is erect, the venous return must take collateral, valved pathways. Blood must pour down a valveless vein, and it is

therefore reasonable to assume that an old, sclerosed, canalized femoral or external iliac vein is better divided. I have never performed division of such a vein for back pressure alone, not fully understanding the indications, but I am sure that the procedure—barring the risk of any such operation in patients of middle age or beyond—will always do good, and never harm.

SUMMARY AND CONCLUSIONS

Evidence has been produced to show that bland, nonobstructing thrombosis of the leg, whether occurring in active life or life in bed, and whether confined to the venous plexuses among the muscles below the knee or occupying as well the femoral and even iliac veins, is a frequent source of pulmonary embolism. This type of thrombosis, though difficult of identification, can often be diagnosed, whether or not embolism has occurred, by a combination of clinical symptoms with discomfort behind the knee on forced dorsiflexion of the foot. Conservative treatment of this disorder is usually justified, but when embolism has occurred or when symptoms and signs have recurred at least once, exploration and division of the femoral vein are advisable.

Exploration and division of the femoral and iliac veins may also be indicated to cure peripheral vasospasm, especially when the vein has been the seat of previous thrombophlebitis, and to guard against the further recurrence of pulmonary embolism repeated once or more.

Division of the superficial femoral vein, in the presence of a bland, nonobstructing thrombosis below the knee, is rapidly curative and leads to no swelling and cyanosis of the leg. Division of the common femoral and profunda veins for a bland, nonobstructive thrombosis that occupies the femoral vein itself causes considerable edema and cyanosis.

Division of the superficial femoral, common femoral or even common iliac vein, following an old, canalized thrombophlebitis, causes little disturbance and may, by relief of reflex vasospasm and by the prevention of backflow in the vessel, be of benefit to the venous circulation.

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REFERENCES

- Homans, J. Thrombosis of the deep veins of the lower leg, causing pulmonary embolism. *New Eng. J. Med.* 211:993-997, 1934.
- Idem.* *Circulatory Diseases of the Extremities.* 330 pp. New York: Macmillan Co., 1939.
- Idem.* Venous thrombosis in the lower limbs: its relation to pulmonary embolism. *Am. J. Surg.* 38:316-326, 1937.
- Kulenkampf, D. Die Verhütung schwerer und tödlicher Embolien durch Ausräumung der Vena iliaca. *Arch. f. klin. Chir.* 193:727-736, 1938. The prevention of severe or fatal emboli by emptying of the iliac vein. *Internat. Abstr. Surg.* 68:216, 1939.
- Fründ, O. discussion of Kulenkampf.⁴
- Läwen, A. Thrombektomie als Frühoperation bei Durchblutungsstörung durch akute massive Thrombose der Vena femoralis und Vena iliaca externa. *Zentralbl. f. Chir.* 65:2139-2146, 1938.
- Leriche, R. Traitement chirurgical des suites éloignées des phlébites, et des grands oedèmes non médicaux des membres inférieurs. *Bull. et mem. Soc. nat. de chir.* 53:187-195, 1927.
- Läwen, A. Ueber Indikationsstellung, Technik und Erfolge der operativen Behandlung der blanden Venenthrombose. *Zentralbl. f. Chir.* 65:1089-1094, 1938.
- Idem.* Weitere Erfahrungen über operative Thrombenentfernung bei Venenthrombose. *Arch. f. klin. Chir.* 193:723-726, 1938.
- Frykholm, R. The pathogenesis and mechanical prophylaxis of venous thrombosis. *Surg., Gynec. & Obst.* 71:307-312, 1940.
- Bazy, L. Thrombose de la veine axillaire droite (thrombophlébite dite "par effort"). Phlébotomie. Ablation des caillots. Suture de la veine. *Bull. et mem. Soc. nat. de chir.* 52:529-533, 1926.
- Dougherty, J. and Homans, J. Venography: a clinical study. *Surg., Gynec. & Obst.* 71:697-702, 1940.
- Leriche, R. and Geisendorf, W. Résultats d'une thrombectomie précoce avec résection veineuse dans une phlébite grave des deux membres inférieurs. *Presse méd.* 47:1301, 1939.
- Ochsner, A. and DeBakey, M. Thrombophlebitis: role of vasospasm in production of clinical manifestations. *J. A. M. A.* 114:117-124, 1940.
- Idem.* The treatment of thrombophlebitis by novocaine block of the sympathetics. *Surgery* 5:491-497, 1939. Abstract in *Internat. Abstr. Surg.* 69:382-384, 1939.

DISCUSSION

DR. HENRY H. FAXON, Boston: Our active interest in this type of operation at the Massachusetts General Hospital goes back only a few years, and it is characteristic of Dr. Homans's enthusiasm in this field that he was doing some such operation many years ago.

In my discussion of his paper I shall confine myself to the operation as it relates to the prevention of emboli. I should like to make three points and possibly ask one question.

The first point, it seems to me, is of fundamental importance in a consideration of this whole problem, and Dr. Homans has not been perhaps too explicit concerning it. Specifically we should like to know, in a patient with a deep phlebitis, what are the chances of his getting an infarct, and what are the chances of his getting a fatal pulmonary embolus. The operation mentioned by Dr. Homans is not without a certain amount of risk, and to evaluate the urgency for doing it, one should know what chance the patient runs of having a serious catastrophe if the operation is not performed.

Dr. Welch and I, at the Massachusetts General Hospital, have reviewed the cases of clinical phlebitis and pulmonary embolus in the last few years. From this study we have come to believe that if a patient has a deep phlebitis in an extremity, he stands one chance out of three of having a pulmonary infarct, and one out of twenty-five of having a fatal massive embolus.

We do not know yet, because we have not done enough operations, how great is the risk of the procedure suggested by Dr. Homans. The risk is small, I am ready to admit. We have done about twelve of these operations with certain modifications of the technic outlined by Dr. Homans. We have had no fatality at the hospital. I have had one fatality in a patient at an outside hospital, who was operated on when she was in extremis. She had a high temperature, had had multiple infarcts and was obviously going to die if nothing was attempted, and she did die following exploration of the femoral vein.

My second point, one on which he laid very little stress, and one that I consider very important, is that the age of the patient makes a great deal of difference as to whether or not this operation should be carried out.

In looking over the cases of deep phlebitis at the hospital, it was interesting to note that if the patient was under fifty years of age, the chance of his having a fatal massive pulmonary embolus was very small. Less than 2 per cent of the cases under the age of fifty had a massive pulmonary embolus from a demonstrable, clinical phlebitis. On the other hand, when the people with deep

phlebitis were between the ages of fifty and sixty, about 7 per cent suffered a massive embolus, and in the small group of patients over sixty who had deep phlebitis, nearly 20 per cent had a massive fatal embolus.

It is our belief at the present time, and it is subject to revision, that we should be strongly tempted, in a case of deep phlebitis under the age of fifty, to treat the patient conservatively with the measures we already know, including the use of heparin. When we consider patients who are older, the urge to do this operation, in our minds, becomes progressively greater.

The third point I should like to make is to stress again what Dr Homans has suggested, namely, that the problem of massive pulmonary embolus is by no means synonymous with that of demonstrable clinical phlebitis. In the last few years we have had 128 cases of massive pulmonary embolus, and in less than 6 per cent was there in the record any suggestion of a deep phlebitis. It is true, probably, that if the examination of those patients had been carried out more carefully many of them would have been found to have had definite or suggestive signs of deep phlebitis.

The question I should like to ask Dr Homans is, Why, when he believes that most of these emboli come from the popliteal space or the venous plexus in the calf of the leg and that the valves of the deep system are extensively damaged following a deep phlebitic process,—an assumption that I question,—should he ever suggest opening the vein, aspirating the clot, and then suturing that opening in the vein and heparinizing the patient? I think that if an operative procedure is indicated, one should certainly put a dam across that femoral vein so that an embolus from the lower portion of the extremity could not possibly become dislodged and give the case a fatal outcome. In other words, one may open a certain number of femoral veins and find no clot, or one may open a certain number and aspirate a clot, but in either event there is no definite assurance that there is no additional clot in the region of the popliteal space or calf muscles that may still be a menace to the patient if the continuity of the vein is not interrupted in some way.

DR EUGENE E O'NEIL, Boston. Anyone who has seen a patient die of pulmonary embolism due to a known lower leg thrombosis must be impressed by the necessity of doing a femorofemoral vein ligation.

My attention was called to the urgency of this procedure some years ago in a woman whom I had discharged three months after an original trauma to the lower leg, and in whom I had made a diagnosis of thrombosis of the posterior tibial veins. I mention this because it brought home to me with a shock something that I had not appreciated before, namely, that people can have propagating clots in their venous systems for a very long time, and that these clots can become detached and cause sudden death. This particular case was proved at autopsy. Since that time I have explored and ligated 20 cases.

I concur in what Dr Faxon has said about the age limits for this group. Eighteen of my patients were over the age of fifty-five. I had an impression in reading the original paper that Dr Homans sent to me that he was somewhat emphatic in stating that this operation should be used only in the young and middle-aged groups. Perhaps my conception of middle age will change as I grow a bit older.

I might add that all these cases have been operated on in accordance with the indications that Dr Homans has laid down, and that I am quite in agreement with them. The technic does not differ materially from his, except that I believe that the majority of these cases can be ap-

proached below the inguinal ligament through the superficial femoral vein. Although I have used off four external iliac veins and two common iliac veins, at the present time I think that most of these thrombi can be approached through the superficial femoral vein, and the clot removed, with little likelihood of a fatality.

Concerning the tying off of the femoral vein for recurrent emboli and recurrent phlebitis, my experience is confined to a single case. In cases of acute phlebitis in various veins, as well as recurrent phlebitis, the quickest way to stop the phlebitis is to do an immediate ligation. I should like to make a plea here that in all these cases of acute phlebitis in superficial veins, an immediate ligation be done. I am sure that that will get the patient back to normal much more quickly than any other method. If this is so, it seems to me that the application of that principle to the deep vein is sound.

One more thought concerning these cases of chronic vasospasm, which manifest these causalgia-like signs and symptoms. Since I have had no experience with exploring these veins for that condition, I should consider a lumbar sympathectomy not only to be technically easier but also, perhaps, to result in more permanent effects. Certainly in my hands the operation for lumbar sympathectomy in these cases has given extremely satisfactory results, more so, probably, than any other condition for which I have done sympathectomies.

The problem that Dr Homans has presented is a very important and fascinating one. If we remember to look at our patients' legs occasionally, post partum or post operatively, or following trauma, I think that we shall be exploring these veins oftener, and occasionally saving a life.

DR FRANK R OBER, Boston. In some prolonged cases of synovitis of the knee, so-called water on the knee, in which an associated swelling of the calf has not responded to treatment, the diagnosis of phlebitis must be considered.

A few years ago a colleague of Dr Homans and mine had an attack of synovitis of the knee that did not respond to treatment. This man died very suddenly from pulmonary embolus, as the autopsy revealed. It is such cases that usually come to the orthopedic surgeon, who is apt to think in terms of joints. I think it behooves us to think also of the joint in terms of circulation. Treatment of synovitis of the knee is a relatively simple problem, but all of us should be on the alert in making the diagnosis to inspect the circulatory system as well as the knee, because we may thus obtain additional information that has a direct bearing on the joint affection.

DR HOMANS (closing). I have been very much enlightened by this discussion.

Dr Faxon asks why, having opened a vein, one should ever close the opening and heparinize. I was thinking of the cases in which the thrombosis has occurred above the point where the vein is conveniently opened. All explorations must be made, practically, through the groin; there may be thrombosis above that point, and it does little good to divide the superficial femoral vein alone, since plenty of current comes from the various branches that enter the common femoral and external iliac veins. It was in relation to that that I considered the possibility of heparinization and closure of the opening.

Of course, for all thromboses below the groin I think the vein ought to be divided. I am sure that the vein ought never to be closed and heparinized in such cases.

When I heard Dr O'Neil use the word "ligate," it excited me, as it always does, because I think one should not speak of ligating a vessel. You cannot divide a vessel without ligating, but if you ligate it alone, you do not

do the same thing as if you divide it. I think we have used the word loosely. Dr. O'Neil really means "divide," or even "resect."

In respect to Dr. O'Neil's remarks about the relief of peripheral vasospasm by sympathectomy rather than by exploring the vein itself, I am inclined to agree with him, but I have been trying to learn something about the subject by exploring the vessels themselves, and in one or two cases I have relieved peripheral spasm by dividing the vein where there was an obvious thickening of its wall, so that sympathectomy has not been required.

I was interested in what Dr. Faxon had to say about percentages of infarction and embolism, which is very much worth considering. All that I have said on the subject really has back of it the idea that one should have no accidents following the operations I have recommended and that one should therefore do better than Nature will alone. That one can perform these operations without any accidents or with fewer accidents in the way of embolism than when no operation is used, is not yet clearly proved, but I think that the procedures are safe.

As to the age of the patient, I believe I agree entirely. I have been using division of the vein for two purposes. One was to cure the disease, and the other was to prevent

embolism. Division of the vein in thrombosis below the knee cures the disease very rapidly, and although I am sure that these young people may suffer embolism, they seldom actually do so. On the other hand, the disease is very rapidly cured.

In respect to the disease that begins below the knee,—the quiet disease, the source of the fatal embolism,—I have learned from Dr. John Sears that he sees more cases with outspoken symptoms than I do. He showed me a case this summer of a patient with a tender calf, slight swelling and real pain. I have been assuming always that patients whose thrombosis takes place among the muscles of the calf show almost no symptoms, and I have taken it for granted that the more symptoms the patient exhibits, the more inflammatory is the disease, and the less the chance of embolism. Whether that is a proper point of view, I do not know. On the whole I think it is, but I know that Dr. Sears has been dividing these femoral veins in cases in which the patient's symptoms have been outspoken, and yet the thrombosis has been proved, on the operating table, to be of the lower-leg rather than the femoroiliac type.

I am very much obliged for the discussion, but I should have been more obliged to the discussers if they had not taught me quite so much.

SARCOIDOSIS WITH BRONCHIAL INVOLVEMENT*

Report of a Case with Bronchoscopic and Pathological Observations

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SARCOIDOSIS, or Hutchinson-Boeck's disease, is a generalized systemic disease that, according to Hunter,¹ may involve, in addition to the skin, the lymph nodes, spleen, lungs, bones, mucous membranes, conjunctivas and parotid glands. The histology of the lesions resembles that of tuberculosis except that no caseation is observed and no tubercle bacilli are found, even by guinea-pig inoculation. The disease has been frequently reported involving the lungs and tracheobronchial lymph nodes, but so far as we have observed it has not been reported clinically in the tracheobronchial tree. Snapper,² however, states that Boeck reported sarcoid occurring in the bronchus. After looking through the original articles of Boeck to which Snapper refers, we have been unable to confirm this. In 1929 Bernstein, Konzle-mann and Sidlick³ reported a case of Boeck's sarcoid with involvement of the bronchial mucosa. Clinically their patient showed a bilateral hydrothorax, with severe dyspnea. There was no wheeze, no bronchoscopy was performed, and no clinical diagnosis of bronchial sarcoid was made. At

autopsy the bronchial lesion was represented by small hemorrhagic patches. From microscopic examination these authors concluded that the lesion in the bronchiole was an extension from the adventitia of an associated arteriole. Opsahl⁴ recently reported a case of bronchial obstruction caused by a mass that, when removed bronchoscopically, had the characteristic histology of sarcoid. In that case, however, tubercle bacilli were found histologically and by guinea-pig inoculation. It therefore appears that he was dealing with tuberculous tracheobronchitis and not with sarcoid. Spencer and Warren⁵ reported autopsy findings in a case of sarcoid in which the trachea showed numerous lesions both immediately beneath the mucosa and among the mucous glands, where there was considerable distortion, fibrosis, round-cell infiltration and degeneration. In their case the bronchi were normal, and the tracheal lesions submucosal.

The following case is, we believe, the first to be reported of definitely intrabronchial sarcoid lesions in which the diagnosis was made by bronchoscopy.

CASE REPORT

R. C. (M. G. H. No. 165665), a 20-year-old Negress, first entered the hospital on December 20, 1938, complaining of

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cough. She had been well until 1 year before admission, when she developed a cough not associated with sputum or chest pain. For 6 months she had experienced weekly

2 or 3 cm. in diameter. The temperature varied from 98 to 102°F., the pulse from 80 to 120, and the respirations from 20 to 30.

The urine showed the slightest possible trace of albumin. The red-cell count was 4,500,000, and the white-cell count 5,150,000, with 56 per cent polymorphonuclears, 29 per cent lymphocytes, 10 per cent monocytes, 3 per cent eosinophils and 2 per cent basophils. The platelets were normal; the red cells showed slight hypochromia. A tuberculin test with a 1:10,000 dilution was negative. A blood Hinton test was negative.

X-ray examination of the chest showed clear lung fields. There was widening of the superior mediastinum anteriorly, more marked on the right, which was interpreted as enlarged lymph nodes consistent with mediastinal lymphoma. There was no evidence of widening of the carina. The trachea and esophagus were not displaced. The hands and feet were normal.

The right supraclavicular lymph node was removed, and when examined microscopically showed complete replacement of the lymphoid tissue by well-circumscribed tubercles composed of epithelioid cells, with an occasional Langerhans giant cell but without any caseation—a picture characteristic of sarcoid. A stain for tubercle bacilli was negative. The patient was discharged on the 11th day to a convalescent home.

The second admission took place 2 months later. At this time the patient complained of continuous sharp pain in the right flank and right shoulder, with pain on coughing or deep breathing. Physical examination showed several pea-sized lumps under the skin in the right chin, right forearm, right 12th rib posteriorly and left 2nd rib



FIGURE 1. *Bronchoscopic View at the Carina in Sarcoidosis.*

Note the widening of the carina and the intrinsic bleb-like lesions on walls of both the main bronchi.

night sweats, and she had lost some weight. Two months before entry the cough was productive of whitish phlegm, and a mass was noted in the right supraclavicular region. The past and family histories were noncontributory.

Physical examination showed a well developed and well-



FIGURE 2. *Photomicrograph of One of the Bronchial Biopsy Specimens.*

This shows several sarcoid lesions in the region of a group of mucous glands.

nourished colored woman in no pain or discomfort. The only positive findings were palpable, nontender cervical, inguinal and right supraclavicular lymph nodes, measuring

anteriorly. Tuberculin tests with 1:5000, 1:1000 and 1:100 dilutions were negative. A biopsy of a subcutaneous nodule in the right flank was reported as consistent with sarcoid.

The temperature varied from 98 to 99°F., the pulse from 70 to 90; and the respirations were 20. Examination of the sputum was negative for tubercle bacilli.

After 2 weeks in the hospital the patient was discharged to a convalescent home, where a regimen of rest and high-vitamin diet produced definite improvement. Two months later it was noted that the lymph nodes in the right lower neck seemed a little smaller and softer. Moist sibilant and sonorous rales were heard in the chest on both sides. A skin lesion appeared on the left cheek.

The third admission occurred 8 months later, in January, 1940. During the month before entry, it was noted that the patient was getting worse, had been wheezing and

and reddened throughout, and the lumen markedly narrowed, so much so that the No. 7 bronchoscope would not pass into the right lower lobe. None of the orifices could be seen because of edema of the mucosa. Soft esophageal bougies Nos. 12 to 16 passed satisfactorily into the lower lobe. Because of dyspnea during bronchoscopy, oxygen was administered through the bronchoscope, with marked improvement. The left bronchial tree showed an appearance similar to that at the right, with red edematous mucosa and bleb-like formation. The orifices could not be seen because of edema. A No. 16 bougie was passed into the left lower lobe. The conclusions from bronchoscopy were as follows: definite reddening and edema with bleb-like



FIGURE 3. Photomicrograph of a Cervical Lymph Node.

This shows complete replacement of the lymphoid tissue by sarcoid, tubercle-like nodules.

was feeling too sick to work. There was marked generalized lymphadenopathy, especially in the cervical, preauricular and submental regions. Large "furniture-moving" rales were heard throughout the chest. X-ray examination of the chest showed a marked decrease of the mediastinal mass, particularly on the right. The lung fields were clear.

At this time the chief problem was respiratory difficulty suggestive of partial tracheal or bronchial obstruction. The picture clinically was that of asthma, with universal wheezing and rhonchi. In view of these findings and the possibility of tuberculous tracheobronchitis, bronchoscopy was suggested, although the patient seemed rather ill and many of the staff were unenthusiastic.

Bronchoscopy was carried out on February 9. The positive findings were as follows: The mucosa of the trachea was somewhat reddened and edematous. The carina showed definite reddening and thickening, with yellowish bleb-like lesions 2 or 3 mm. in diameter (Fig. 1). The right bronchial tree showed the mucosa to be edematous

formations through the entire bronchial tree, and marked narrowing of the main bronchi, accounting for wheeze and dyspnea. Several biopsy specimens were taken from these lesions and showed replacement of the mucosa by an edematous inflammatory reaction composed of lymphocytes and a few polymorphonuclears. Scattered through this tissue were many tubercle-like lesions composed of epithelioid cells with giant cells—an appearance consistent with sarcoid (Fig. 2). Biopsy specimens from another cervical lymph node (Fig. 3) and from a skin lesion in the region of the temple showed a characteristic sarcoid appearance. A smear from material obtained at bronchoscopy showed no tubercle bacilli, and guinea-pig inoculation was negative for tuberculosis. Guinea-pig inoculation of a biopsied lymph node showed no tuberculosis. Repeated examinations of the sputum for tuberculosis were negative. A tuberculin test with a 1:100 dilution was again negative.

On the day after bronchoscopy, the patient was notably better and without wheeze. There was also definitely less cough and dyspnea. Five days following bronchoscopy,

however, there was an increase in wheezing. Ten days later, therefore, bronchoscopy was repeated. At this examination the mucosa showed improvement. There seemed to be fewer lesions, which were pearly gray and almost cystic at the carina. Along the wall of the left main bronchus the appearance was that of whitish, fibrous stenosis with definite narrowing of the lumen. Bougies up to No 20 were passed into both lower lobe bronchi, and 20 per cent cocaine-adrenalin was applied. A moderate amount of secretion was aspirated. Except for a temperature rise to 104°F, a week after the second bronchoscopy, thought to be due to an attack of grippe, convalescence was uneventful. The patient was discharged improved to a convalescent home on March 25.

She was last seen in the Pulmonary Clinic of the Out Patient Department on October 16, at which time she had no complaints, was feeling very well and was able to do housework. There was less dyspnea, no wheezing and very little cough or sputum. The appetite was very much improved, and the lymph nodes were much smaller.

SUMMARY

A case of generalized sarcoidosis is reported in which signs and symptoms of bronchial obstruction

were the principal features. Bronchoscopy showed extensive intrinsic involvement of the bronchial mucosa, and treatment through the bronchoscope resulted in marked clinical improvement.

So far as we have been able to determine, this is the first reported case of sarcoidosis with intra-bronchial lesions in which a positive diagnosis was made by bronchoscopy.

REFERENCES

- 1 Hunter, F. T. Hutchinson-Rock's disease (generalized 'sarcoidosis'). Historical note and report of case with apparent cure. *New Eng J Med* 214:346-352, 1936.
- 2 Snapper, I. and Pompei, A. W. M. *Pseudo-Tuberculosis in Man*. 90 pp. Haarlem: H. J. van der Vliet, 1938. P. 4.
- 3 Bernstein, M., Konzelmann, F. W. and Sidlick, O. M. Boeck's sarcoid. Report of case with visceral involvement. *Arch Int Med* 41:721-734, 1929.
- 4 Opsahl, R. Un tuberculome bénin—vraisemblablement identique au lymphogranulome bénin de Schaumann—causant la sténose bronchiale. *Acta med Scandinav* 99:511-524, 1939.
- 5 Spencer, J. and Warren, S. Boeck's sarcoid. Report of a case with clinical diagnosis confirmed at autopsy. *Arch Int Med* 62:285-296, 1938.

PERIPHERAL ARTERIAL EMBOLISM*

A Discussion of the Postembolic Vascular Changes and Their Relation to the Restoration of Circulation in Peripheral Embolism

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BROOKLINE

THE successful restoration of the circulation in a limb following peripheral embolism depends chiefly on early and adequate treatment. All writers on the subject stress the importance of this fact. Thus, in a series of 282 cases collected from the literature, Pearse¹ found that when embolectomy was performed within ten hours of lodgment of the embolus, the extremities were saved in 40 per cent of the cases; after ten to fifteen hours, in only 16 per cent; and after thirty hours, in none. In a series of 129 cases reported by Danzis,² 47 patients were operated on within eight hours, and in 27 cases (57 per cent) the circulation was restored; in 24 cases operated on between eight and twelve hours after lodgment, it was restored in only 6 (25 per cent). Similar statistics are given by Key,³ Petitpierre⁴ and Dschanelidze and Ogloblina.⁵ Early treatment is of equal importance when cases are treated with the negative positive pressure (pavey) apparatus, as was shown by me⁶ in a series of 13 cases. In this group, 9 (60 per cent) of 15 extremities were saved; the

treatment was instituted within ten hours in 8 (90 per cent) of these.

The commonest cause of gangrene following peripheral embolism is the failure to institute adequate treatment before the arteries distal to the embolus have been irreparably damaged. It is rarely the result of poor surgery or inadequate treatment. Thus the loss of a limb is directly attributable to the failure of the physician who first sees the patient either to make a correct diagnosis or to realize the imperativeness of early treatment. Since the diagnosis of arterial embolism has been discussed adequately by Pearse,¹ Danzis,² Key,³ McKechnie and Allen,⁷ Allen⁸ and others, it is not necessary to consider this phase of the subject. On the other hand, very little has been written concerning the pathologic changes that take place in the arteries of an extremity following the lodgment of an embolus, and the significance of these changes in reference to restoration of the circulation.

The purpose of this paper is to emphasize the importance of early adequate treatment in arterial embolism by discussing the postembolic arterial

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changes in a group of selected cases of peripheral embolism treated in the Peripheral Vascular Clinic of the Massachusetts General Hospital. In some of these cases there was a successful restoration of circulation, whereas in others gangrene developed.

Failure to restore the circulation in an extremity following embolism is due primarily to the marked vasoconstriction distal to the embolus, and the formation of a secondary thrombus in the arterial tree that extends distally from the site of embolism into all the tributaries and finer ramifications. The marked spasm of the arteries has been recognized for many years. It has been described by Seifert⁹ and observed by many surgeons who have performed embolectomies. The secondary thrombosis has also been described by Nyström,¹⁰ Zierold¹¹ and other authorities, but its role in the results obtained has not been sufficiently stressed in the literature. This secondary thrombus, if it forms, makes the difference between success or failure in the restoration of the circulation. It undoubtedly develops as a result of the extreme degree of vasoconstriction and slowing of the blood stream, which occurs distal to the site of embolism, since the marked narrowing of the main and the collateral arteries, in addition to the obstruction by the embolus, causes practically a cessation of the arterial inflow to the extremity. This leads to stagnation of the blood in the involved arteries, which later clots to form the thrombus. Whether thrombosis begins at the most distal portion of the extremity and extends upward, or just distal to the embolus, as a result of the irritation to the intima, has not been established.

The constriction of the artery distal to the embolus, which probably occurs almost instantaneously after the lodgment of the embolus, is followed in a few hours by the development of complete thrombosis of the artery. In one of the cases reported in this article, an extreme degree of arterial spasm was noted one and a half hours after the time of embolism, and in another case, a very extensive thrombosis had formed nine hours after the time of embolism. The ideal treatment to restore the circulation of an extremity, following the lodgment of an embolus, is to remove it as soon as possible. In addition, treatment should be instituted to prevent the formation of a secondary thrombus, since this may occur even after embolectomy, owing to damage of the intima, from both the operation and the impaction of the embolus. This treatment should be directed toward the production of peripheral vasodilatation to increase the arterial inflow to the extremity. One method of doing this is to interrupt the sym-

thetic vasoconstrictor impulses by a novocain or alcohol injection of the lumbar ganglia. Another is by mechanical dilatation, using intermittent suction and pressure (pavex) or intermittent venous occlusion. The intravenous injection of heparin may also be used to prevent the formation of the secondary thrombus. To emphasize the role of vasoconstriction and secondary thrombus formation, the following cases are presented.

CASE REPORTS

CASE 1. A 54-year-old man with rheumatic heart disease and auricular fibrillation suddenly developed pain and numbness of the left arm. Examination revealed that there were no pulsations below the axillary artery. An operation was performed 1½ hours after the occurrence of the embolism, and an embolus was removed from the left axillary artery. At operation, marked constriction of the artery to about one third its normal caliber was noted

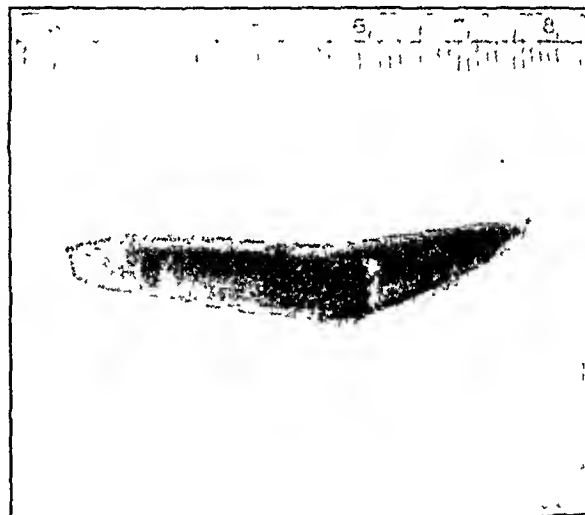


FIGURE 1.

This photograph shows the embolus removed from the left axillary artery in Case 1, one and a half hours from the time of embolism. It should be noted that this specimen consists only of the embolus, without any evidence of a secondary thrombus.

distal to the embolus. There was practically no vasoconstriction above the site of embolism. After removal of the embolus, with the artery occluded proximal to the opening, there was an excellent flow of blood from it, indicating that the collateral arterial blood channels were patent and that there was no secondary thrombus in the arterial tree distal to the site of embolism. As further evidence of this, there was an immediate restoration of the circulation following suture of the arteriotomy wound, and in addition, examination of the specimen revealed it to be a single homogeneous blood clot (Fig. 1).

CASE 2. A 45-year-old man with rheumatic heart disease and auricular fibrillation suddenly developed pain and numbness of the left leg. Examination showed no pulsations in any of the arteries of this extremity. They were normal in the right leg. A diagnosis was made of an embolus lodged at the bifurcation of the left common iliac artery. Two and a half hours after the time of

embolism, an embolus was removed from this artery. The operative findings are shown in Figure 2. The extreme narrowing of both the external and internal iliac arteries distal to the embolus should be noted. At operation this constriction extended as far as the vessels could be traced distally, that is, down to the inguinal ligament and into

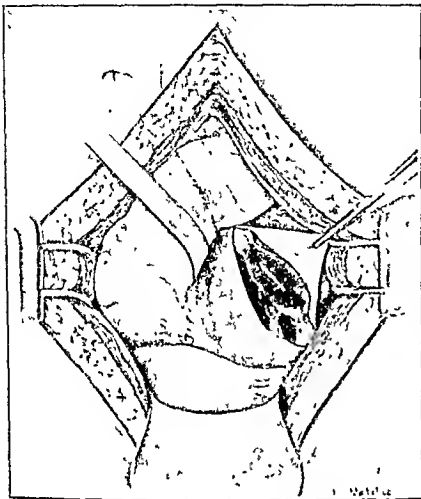


FIGURE 2.

This drawing shows the transabdominal operative exposure for embolism of the left common iliac artery used in Case 2. This exposure was made within two and a half hours after the lodgment of the embolus. The marked narrowing of the external and the internal iliac arteries should be noted. This extended distally as far as the arteries could be traced. The constriction of the common iliac artery proximal to the embolus, on the other hand, is seen to be present over a very short distance. The incision made in the artery to remove the embolus is shown.

the pelvis, a distance of several centimeters. The common iliac artery above the embolus was also narrowed, but of utmost importance was the fact that contrary to the constriction distalward, it was very sharply localized, so as to involve less than a centimeter of the artery. Above this point the artery was of normal caliber. The embolus removed is shown in Figure 3. At operation there was no evidence of a secondary thrombus distal to the embolus, in either the internal or the external iliac arteries. There was profuse back bleeding when the tourniquets on these vessels were released. In addition, after the operation was concluded, it was possible to palpate the pulsations in the popliteal artery, the dorsalis pedis and the posterior tibial arteries. This was positive evidence that there had been a complete re-establishment of the arterial circulation, and that a secondary thrombus had not formed within 2½ hours of the time of embolism.

In the two following cases the arterial circulation was not restored following embolectomy; the result in both was gangrene, necessitating amputation

CASE 3. A 55-year-old woman with rheumatic heart disease and auricular fibrillation had been in the hospital for 10 days, when she was suddenly seized with severe pain and numbness in the right leg. A diagnosis of peripheral embolism of the right common femoral artery was not made until 8 hours later. The embolus (Fig. 4) was removed approximately 9 hours after the onset of symptoms.

With these facts in mind, a careful examination of the specimen yielded some highly valuable information. The embolus consisted of two parts, a short, thick one, and a long, narrow one. The former was grayish pink and quite firm in consistence, whereas the latter was dark reddish brown and very friable. The thicker portion represents the embolus, the narrow portion a secondary thrombus, which had formed after lodgment of the embolus. The embolus was lodged at the bifurcation of the common femoral artery and the thrombus was found to be

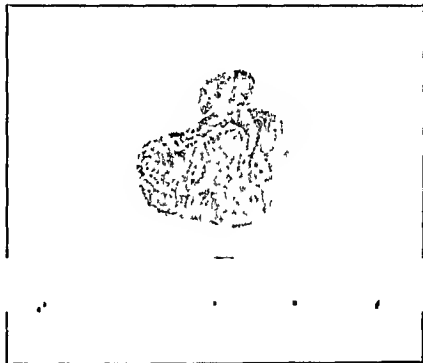


FIGURE 3.

This is a photograph of the embolus removed from the left common iliac artery at its bifurcation into the external and internal iliac arteries in Case 2. The operation was done two and a half hours after the lodgment of the embolus. The main part of the embolus lay in the common iliac artery. The two projections on the specimen represent the portions of the embolus that were in the external and internal iliac arteries. The diameter of these indicates the marked constriction of the arteries. The absence of any secondary thrombus should be noted.

lying distal to it. The difference in the diameter of the two should be noted. The embolus was several times greater in caliber than the secondary thrombus. Despite this fact, each completely filled the artery in which it was lodged. Thus examination of this specimen showed clearly the marked degree of arterial constriction that takes place distal to the site of embolism.

The removal of the embolus was a relatively simple matter, but the secondary thrombus was removed with great difficulty. The only satisfactory method of extracting it was by milking the vessel upward, and even then it was impossible to ascertain if all of it had been obtained. Of great significance was the fact that there was very little bleeding from the distal part of the femoral artery after the removal of this specimen, which indicated that it

had not been completely removed. This was further substantiated immediately after the operation by the lack of pulsation in the popliteal, dorsalis pedis and posterior tibial arteries. Gangrene developed in the foot and lower leg within 24 hours, necessitating a mid-thigh amputation.

CASE 4. A 61-year-old man who had coronary heart disease developed an embolism of the left popliteal artery,

caliber as the embolus, was the proximal secondary thrombus. The two thrombi were about the same length. It is to be noted, however, that the proximal one is shown in its entirety, whereas only a small portion of the distal one can be seen in the photograph. There can be little doubt of these facts, because on removal of the embolus and the proximal thrombus there was a tremendous spurt of arterial blood from the upper end of the incision in the popliteal

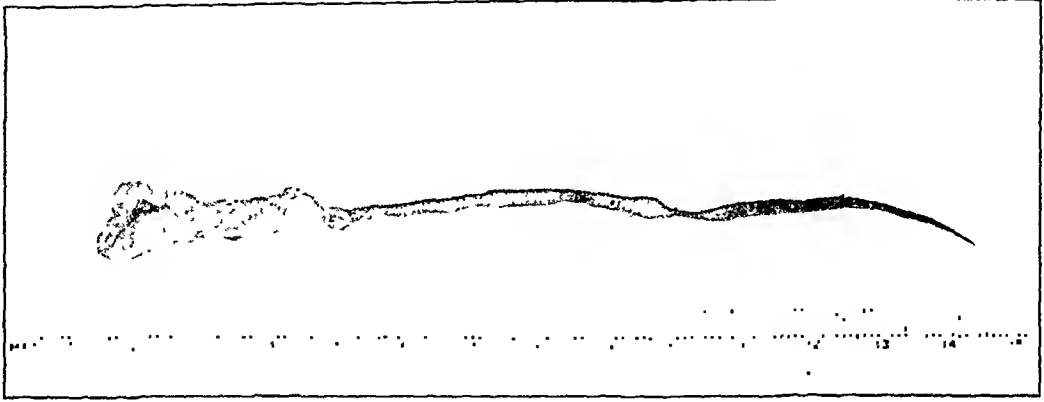


FIGURE 4.

This photograph shows the embolus and a portion of the secondary thrombus that had formed distal to the embolus from the femoral artery in Case 3. The specimen was removed from the common femoral and the superficial femoral arteries nine hours after the time of embolism. The portion with greatest diameter represents the embolus and the long narrow portion, the secondary thrombus. The small caliber of the latter indicates the marked constriction that was present in the arteries distal to the embolus.

and operation was performed 72 hours after its occurrence. The embolus and a portion of a secondary thrombus were removed, but gangrene of the foot developed, necessitating amputation of the leg.

Examination of the specimen (Fig. 5) showed it to

artery, yet there was no bleeding from the lower end. In addition, the posterior tibial artery was exposed behind the medial malleolus, and when opened was found to be completely occluded by the distal thrombus. The artery was irrigated with a 2 per cent solution of sodium citrate from

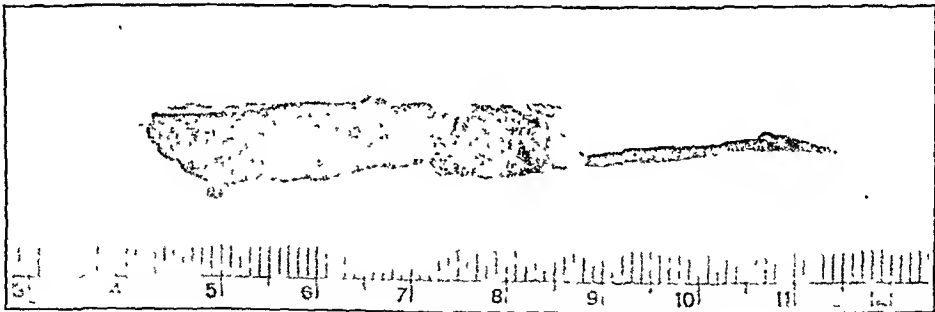


FIGURE 5.

This is a photograph of the embolus and a small portion of the distal and proximal secondary thrombi attached to it removed from the popliteal artery of Case 4 seventy-two hours after the time of embolism. The central gray portion represents the embolus. The narrow part of the specimen is a portion of the distal thrombus, and its caliber indicates the extreme narrowing of the arterial tree distal to the embolus. The dark portion at the larger end of the specimen is the proximal thrombus. In contradistinction to the portion of the distal thrombus shown, it represents the entire proximal clot. Its large caliber shows how little constriction of the artery had occurred proximal to the embolus.

consist of an embolus with a distal and proximal secondary thrombus attached to it. The central, light-colored portion represented the embolus, whereas the narrow, dark-colored part was a small piece of the distal thrombus. The dark, thick portion, which was of the same

below upward, a modification of the method described by Lerman, Miller and Lund.¹² Many pieces of the distal thrombus were washed out through the opening in the popliteal artery. Even after a clear flow of the irrigating fluid had been obtained above, there was no evidence of

bleeding from the distal part of the popliteal artery, or from the posterior tibial artery. This showed that the distal secondary thrombus had extended into the branches of the popliteal artery and their tributaries to such an extent as to block all blood flow through them.

Further study of the specimen revealed the state of the arteries proximal and distal to the site of embolism. The fact that the large proximal thrombus was practically the same in diameter as the embolus itself indicates that there was little if any vasoconstriction of this portion of the popliteal artery. In addition, it is to be emphasized that this thrombus was relatively short, so that it interfered very little with collateral circulation, by occluding the openings of arterial branches arising from the popliteal artery above the embolus. In contradistinction, the secondary thrombus distal to the embolus was extremely small in diameter. This indicated the extreme degree of vasoconstriction present in the arteries distal to the site of embolism. Exploration of the posterior tibial artery at the ankle showed that this vasoconstriction and thrombosis extended distally into the foot.

An analysis of the following case, which was treated by the intermittent negative-positive-pressure (pavex) method, gives further evidence of the importance of early treatment in preventing secondary thrombus formation.

CASE 5. A 36-year-old woman was admitted to the hospital because of rheumatic heart disease with mitral stenosis. Five days after admission she first noted numbness of the left foot. An hour and a half later, the left leg was cold and cyanotic up to the knee. There was complete loss of sensation over the entire foot, and the patient could not move the foot or toes. No pulsations were palpable in any of the vessels of both legs, including the femoral arteries. The blood pressure and pulsations were normal in the arm vessels. A diagnosis of a so-called "rider" embolus at the bifurcation of the aorta was made. The left leg remained cadaveric in appearance, but the right maintained a normal appearance, with complete muscular control. The left leg was placed in the negative-positive-pressure apparatus $3\frac{1}{2}$ hours after the initial symptoms were noted by the patient. Ten cubic centimeters of 1 per cent novocain was injected in the neighborhood of the 2nd, 3rd and 4th lumbar vertebrae on the left side. This was done to produce temporary peripheral vasodilatation by interrupting the sympathetic vasoconstrictor pathways, so that an active collateral circulation might be developed. The negative-positive-pressure treatments were continued on the left leg for about 48 hours and then for decreasing intervals, until they were stopped on the 8th day. The right leg was also given some treatment because its circulation began to fail. It responded more rapidly than the left, indicating a better collateral blood supply. The treatments to the right leg were continuous for the first 24 hours, after which they were given at intervals and gradually diminished until they were also stopped on the 8th day after the embolism occurred. At that time, both legs had normal color and warmth, and there was complete control of all the muscles. There was no evidence of gangrene. Yet examination revealed no pulsations in any of the arteries of either leg. Three days later, the patient suddenly lost consciousness and developed a hemiplegia. Death followed in 12 hours. At the post-mortem examination the cause of death was found to be an embolism of the basilar artery and the right postero-medial ganglionic artery.

It is true that this patient survived the primary embolism for only eleven days, which according to some writers is too short a time to allow restoration of circulation in an affected limb. However, it is to be noted that the return of the circulation in the legs was so complete that treatments in the pavex apparatus were discontinued 3 days before death. It seems unquestionable that if this patient had not developed embolism of the cerebral arteries, the circulation of the legs would have been re-

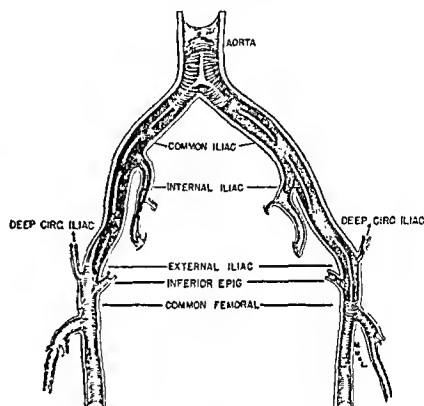


FIGURE 6.

This is a diagrammatic sketch to show the location of the emboli and thrombi in the aorta and its main tributaries in Case 5. On the right this clot extended down to the point where the deep epigastric artery arises from the external iliac. On the left the secondary thrombus had occluded the left common femoral artery. It is to be noted that the vessels distal to the emboli and thrombi remained patent and contained no blood clot.

stored for an indefinite period. An analysis of the post-mortem findings substantiated this view.

At the autopsy it was found that the aorta was occluded at its bifurcation by an embolus and that there were thrombi extending from this distally into the right and left external and internal iliac arteries. On the right, the thrombus extended 6 cm. down the external iliac artery and about 1 cm. above the profunda femoris. In the right internal iliac artery it extended a distance of 9 cm. On the left, the thrombus in the external iliac artery was 17 cm. in length and occluded the bifurcation of the common femoral artery. It was thought that the most distal part of this thrombus at the origin of the profunda represented an embolus, probably a portion of the aortic one, which had broken off and lodged in the femoral artery. The location of the emboli and the thrombi are shown diagrammatically in Figure 6.

The chief significance of these findings was that despite the fact that the embolism occurred ten days previously, the secondary thrombus formation distal to the emboli was checked by the treatment administered. The initial vasoconstriction in the arteries distal to the site of embolism was counteracted for several hours by paravertebral novocain injection about the lumbar sympathetic ganglia. During this time and subsequently, an active circulation of blood through these vessels was enhanced by the use of the negative-positive-pressure apparatus.

The post-mortem findings indicated that this type of treatment, if administered early, aids the development of the collateral circulation around the site of embolism. In addition, by maintaining a blood flow of sufficient volume and rapidity, intra-arterial clotting distal to an embolus does not take place to a sufficient degree to jeopardize the life of the affected limb. It is probable that secondary thrombosis distal to the embolus may occur, but that it is limited to a segment of the arterial tree in which there is apt to be stagnation of the blood. Thus, it will be found to be present between the embolus and the point where the blood re-enters the main arterial channel through collateral blood vessels. This point is especially well illustrated in this case in the right extremity in which the secondary thrombus extended distally to just above the origin of the deep epigastric artery, through which, presumably, blood entered the femoral artery by way of the arteries of the anterior abdominal wall. From an examination of the specimen it should also be noted that no thrombus was found proximal to the embolus at the bifurcation of the aorta.

CONCLUSIONS

From the analysis of these cases of peripheral embolism in which the postembolic findings are considered typical, the following generalizations may be made.

Marked peripheral vasoconstriction of the arteries distal to the site of an embolism uniformly occurs very soon after the lodgment of the embolus. In one case it was noted within an hour and a half. The artery proximal to the embolus, on the other hand, is not affected to the same degree: it maintains its normal caliber except for a very short zone of constriction adjacent to the embolus. The peripheral vasoconstriction plays an important role in the formation of the secondary distal thrombus, which nearly always forms

after the lodgment of the embolus, if early adequate treatment is not instituted.

A thrombus may form distal to an embolus as early as nine hours after the occurrence of the embolism. By then it may be so extensive as to prevent the return of the circulation to the extremity, even though the embolus and a considerable portion of the thrombus are removed.

Thrombus formation proximal to the embolus does not form so extensively as that distal to the embolus. Even after seventy hours in one case, it was only 3 cm. long. It can readily be removed. It is less likely than the distal thrombus to interfere with the collateral circulation, because usually it extends only up to but does not occlude the first major arterial branch proximal to the embolus.

The presence of a distal thrombus virtually precludes the return of circulation to the extremity, because it is impossible, even if the main artery is cleared of blood clot, to remove the thrombus from the smaller tributaries of the peripheral arteries.

Failures in the treatment of peripheral embolism can in most cases be directly attributed to the formation of a secondary thrombus distal to the embolus.

Restoration of the circulation following peripheral embolism can be brought about by means of early (within six hours) adequate treatment, such as embolectomy or the use of intermittent venous congestion therapy, and the interruption of the sympathetic pathways by novocain or alcohol paravertebral lumbar injection. In conjunction with these forms of treatment, the intravenous use of heparin should prove of value in preventing the distal secondary arterial thrombosis.

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REFERENCES

1. Pearse, H. E., Jr. Embolectomy for arterial embolism of the extremities. *Ann. Surg.* 98:17-32, 1933.
2. Danzis, M. Arterial embolectomy. *Ann. Surg.* 98:249, 1933.
3. Key, E. Embolectomy in circulatory disturbances in the extremities. *Surg., Gynec. & Obst.* 36:309-316, 1923.
4. Petitpierre, M. Ueber Embolectomie der Extremitätenarterien. *Deutsche Ztschr. f. Chir.* 210:184-238, 1928.
5. Dschanelidze, J. J. and Ogloblina, S. W. Embolectomie. *Arch. f. klin. Chir.* 149:55-74, 1927.
6. Linton, R. R. Acute peripheral arterial occlusion and its treatment. *New Eng. J. Med.* 216:871-875, 1937.
7. McKechnie, R. E. and Allen, E. V. Sudden occlusion of the arteries of the extremities: a study of one hundred cases of embolism and thrombosis. *Proc. Staff Meet., Mayo Clin.* 10:678-682, 1935.
8. Allen, A. W. The surgical treatment of embolism of the extremities. *New Eng. J. Med.* 201:304-307, 1929.
9. Seifert, E. Die Deutung des Schmerzes bei der arteriellen Embolie. *Deutsche Ztschr. f. Chir.* 232:187-198, 1931.
10. Nyström, G. Zur Prognose und Methodik der Embolectomie. *Acta Chir. Scandinav.* 60:229-254, 1926.
11. Zierold, A. A. The surgical treatment of arterial embolism. *J. A. M. A.* 101:7-9, 1933.
12. Lerman, J., Miller, F. R. and Lund, C. C. Arterial embolism and embolectomy. *J. A. M. A.* 94:1128-1133, 1930.

THE COMPARATIVE PROTHROMBIN RESPONSES TO VITAMIN K AND SEVERAL OF ITS SUBSTITUTES IN A CASE OF NONTROPICAL SPRUE*

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RECENTLY Butt, Snell and Osterberg¹ and Engel² have found that prothrombin deficiency may appear in nontropical sprue. The reduction of plasma prothrombin in sprue presumably represents a general impairment in the absorption and utilization of fats and fat soluble substances, including the fat soluble vitamin K. It is the purpose of this report to present a case of nontropical sprue that developed a severe hemorrhagic tendency, which was completely relieved by the administration of vitamin K or some of its substitutes. This case is of interest in that the intermittent use over an eight month period of several substances possessing vitamin K activity afforded an opportunity to compare the relative antemorrhagic values of these substances in the same patient.

This case was presented in detail elsewhere by Childs and Dick³ before these prothrombin studies were made. The early history is referred to only briefly in this report.

CASE REPORT

A 31 year-old white, married woman was admitted to the Billings Hospital, October 29, 1937, on the medical service of Dr. George F. Dick. During the 3 years preceding admission she experienced marked loss of appetite, increasing weakness, glossitis and voluminous pale tan stools, foul in odor and occurring typically during the morning hours. The weight gradually fell from 126 to 92 pounds during this period.

On admission to the hospital the patient was found to have a macrocytic anemia that responded slowly to iron and liver extracts. Ecchymotic subcutaneous areas were present over the body and extremities, these were not affected by the administration of synthetic vitamin C until the general condition improved several weeks later. Pancreatic juice, obtained from dogs with bile fistulas, was provided by Dr. Lester R. Dragstedt of the Department of Surgery of the University of Chicago, it seemed to exert a definite therapeutic effect on the stool weight, its fat content and the frequency of bowel movements. Stool cultures were negative for monilia after incubation for 11 days. Fat tolerance tests yielded a flat curve whether the test material was given in water or in pancreatic juice.

X-ray evidence of edema of the jejunum, terminal ileum and colon was found.

The patient was discharged March 4, 1938, improved, but was readmitted 3 weeks later complaining of sensations of numbness and tingling in the hands and feet, associated

with some recent weight loss. A moderate anemia was again present, and a blood calcium of 6.2 mg per 100 cc. was found. The patient was given a course of liver extract and daily oral doses of 30 gm of calcium gluconate, 0.2 gm of ferrous sulfate, 40 gm of Armour's pancreatin, 3 ABD capsules, 36 gm of brewer's yeast and 0.075 gm of synthetic vitamin C. Improvement was rapid and she was discharged 1 month later, continuing the above mentioned medications and a diet containing 150 gm of carbohydrate, 85 gm of protein and 140 gm of fat. The course on this regime at home was satisfactory until January, 1939, when the taking of liver extract and pancreatic substance was discontinued for a few days. By February 8 the glossitis had returned, the patient was having frequent bouts of epistaxis, and stools were being passed three or four times daily.

The patient was readmitted on February 16, and a regime similar to the previous hospitalization was instituted. Improvement was slow, and she was discharged again on May 20 on a diet containing 200 gm carbohydrate, 175 gm protein and 90 gm fat. At home she continued to take the same medicinal agents with the daily addition of 20 drops of Drisdol and 0.001 gm of nicotinic acid, on weekly visits to the clinic she was given 3 cc. of Lederle's liver extract concentrate intramuscularly, and 0.05 gm of thiamin chloride intravenously.

The general condition on this regime was satisfactory except for the reappearance of bleeding gums and ecchymosis in July. This hemorrhagic tendency increased, and the menstrual flow in August was extended to 11 days instead of the normal 3 or 4. On September 6, the patient was once more readmitted in an effort to control the bleeding. The prothrombin concentration was 15 per cent of normal, as determined by a modified one-stage technique.⁴ Alfalfa concentrate (Abbott)⁵ was then given in doses of 2 cc four times daily. The prothrombin elevation was sluggish, but after 4 days a level of 38 per cent was reached, after which no bleeding occurred. A prothrombin value equivalent to the normal control (100 per cent) was obtained by the 17th day. The alfalfa concentrate was then discontinued and the patient was discharged on September 25. The prothrombin level was periodically checked and by November 7 had fallen to 33 per cent of normal, at which time several ecchymotic areas appeared. Alfalfa concentrate was again given in similar dosage for 14 days before a normal prothrombin value was reestablished. On November 21, the dose of concentrate was reduced to 2 cc daily for a 2 week period, but on this quantity the prothrombin level slowly fell. The concentrate was then discontinued, and weekly prothrombin determinations were made until February 7, 1940, when the patient again exhibited numerous ecchymoses and bleeding gums. A vitamin K substitute, 2-methyl 1,4 naphthoquinone (Lilly), administered orally in doses of 2 mg four times a day without bile salts, produced a normal prothrombin level in 13 days, this substance was then discontinued. By March 31 the prothrombin level had fallen to 43 per cent of normal. This deficiency was treated by giving a sulfonated derivative of the 2-methyl 1,4 naphthoquinone by vein in doses equivalent

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†This work was aided by a grant from the Douglas Smith Foundation for Medical Research, University of Chicago.

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alent to 12 mg. of the latter once daily on March 21, 23 and 25. By March 27 the prothrombin value was normal.

No further vitamin K therapy was given until April 13, when a prothrombin concentration of 60 per cent was found. At this time 2-methyl-3-phytyl-1,4-naphthoquinone (Merck), identified as synthetic vitamin K₁,⁶ was administered in peanut oil in doses of 2 mg. four times daily without bile salts. In spite of the uninterrupted use of this substance the prothrombin continued to fall slowly over a 12-day period. By April 25, when it had reached 38 per cent, this substance was discontinued, and the 2-methyl-1,4-naphthoquinone derivative was again employed in daily oral doses of 8 mg. The prothrombin

It is generally agreed that in sprue the excessive excretion of fat is due to poor absorption, but it is possible that other factors may be involved.⁹ The malabsorption of fat in this disease presumably could give rise to prothrombin deficiency by diminishing the absorption of fat-soluble vitamin K. However, the slow response of prothrombin to both the oral and parenteral administration of the vitamin and its substitutes in the case reported here suggests that the prothrombin deficiency was due to impairment of the hepatic elaboration of

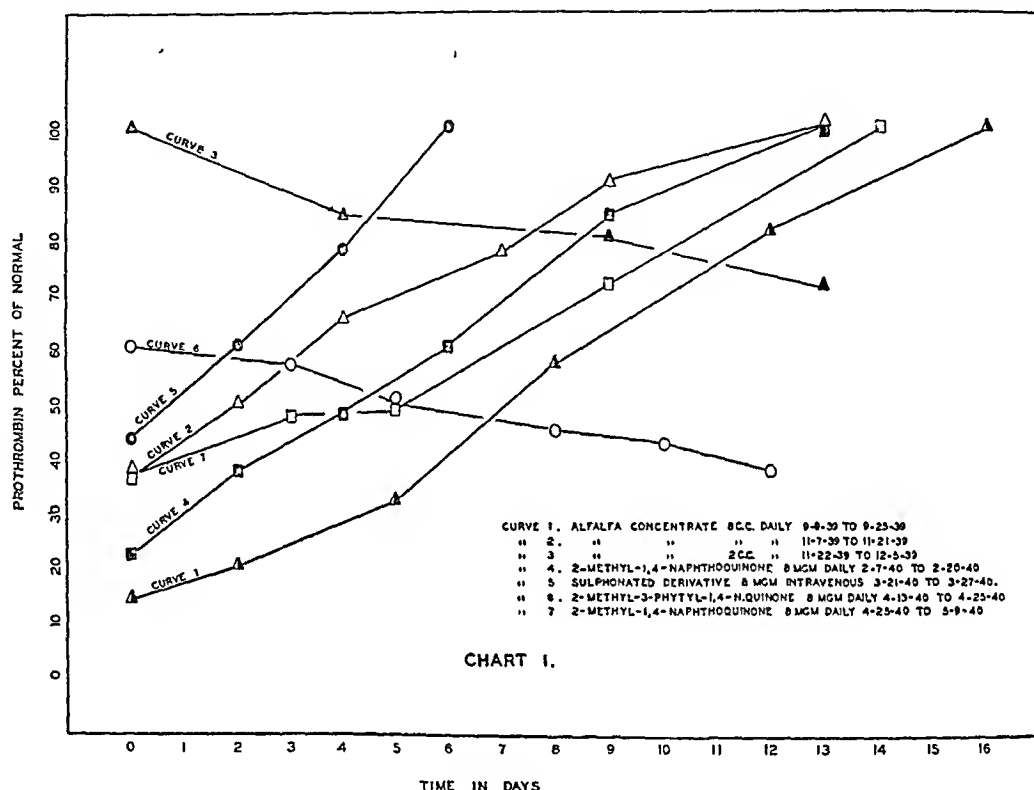


FIGURE 1. Prothrombin Responses to Vitamin K and Three of Its Substitutes.

level again began to rise, reaching normal after fourteen days, a response quite comparable to the earlier course with this substance.

DISCUSSION

It is now well established that the absorption of fat-soluble vitamin K is essential for the elaboration of prothrombin by the liver.⁷ Thus any defective absorption of the vitamin or any impairment of the production of prothrombin by the liver may lead to prothrombin deficiency. The lowered prothrombin in cases of obstructive jaundice is due primarily to impaired absorption of fat-soluble vitamin K. The prothrombin response to this vitamin in obstructive jaundice is exceedingly rapid once the absorption defect has been corrected by the administration of bile salts. In patients whose prothrombin deficiency results from cirrhosis the response to the vitamin is sluggish or entirely lacking.⁸

prothrombin as well as to poor absorption of the vitamin. No other evidence of liver insufficiency was found.

The antihemorrhagic therapy included the following courses: alfalfa concentrate (natural vitamin K₁), two courses; 2-methyl-1,4-naphthoquinone, two courses; an aqueous soluble sulfonated 2-methyl-1,4-naphthoquinone, one course (given parenterally); and 2-methyl-3-phytyl-1,4-naphthoquinone (synthetic vitamin K₁), one course. The prothrombin response to each of these substances is graphically illustrated in Figure 1. In considering the antihemorrhagic values of these various substances, Fernholz and Ansbacher¹⁰ have recently stated that the potencies of the naturally occurring and the synthetic (2-methyl-3-phytyl-1,4-naphthoquinone) vitamin K₁ are essentially equivalent when compared in doses of equal weight; the 2-methyl-1,4-naphthoquinone is approximately four times as potent as either of these

substances. One cubic centimeter of the alfalfa concentrate employed in this study is said to contain a quantity of natural vitamin K₁ equivalent in activity to 1 mg. of 2-methyl-1, 4-naphthoquinone.⁶

When 8 cc. of the alfalfa concentrate or 8 mg. of the 2-methyl-1, 4-naphthoquinone was given in this case, the prothrombin responses, as expected, were quite similar. However, when 8 mg. of the synthetic vitamin K₁ was administered, the prothrombin actually fell from its pretherapeutic level of 60 per cent to 38 per cent over a thirteen-day trial period. The failure of this substance to elevate the prothrombin was undoubtedly due to the low dose, which obviously was only equivalent to 2 mg. of 2-methyl-1, 4-naphthoquinone. At the end of this test period an 8-mg. daily dose of 2-methyl-1, 4-naphthoquinone was substituted for the synthetic vitamin, and in response to this substance the prothrombin rose to normal over a fourteen-day period. A maintenance dose of 2 cc. of the alfalfa concentrate, a quantity equivalent to 8 mg. of the synthetic vitamin K₁, was also ineffective in preventing a decline in the prothrombin level. The activity of the sulfonated compound given intra-

venously cannot be compared with the potencies of the compounds that were administered orally.

CONCLUSION

It can be concluded from the studies on this patient that natural (alfalfa concentrate) and synthetic (2-methyl-3-phytyl-1, 4-naphthoquinone) vitamin K₁ were considerably less active than the 2-methyl-1, 4-naphthoquinone.

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REFERENCES

1. Butt, H. R., Snell, A. M., and Osterberg, A. E. Preoperative and postoperative administration of vitamin K to patients having jaundice. *J. A. M. A.* 113:383-389, 1939.
2. Engel, R. Sprue und Vitamin K-Mangel. *Med. Welt* 13:120-122, 1939.
3. Childs, A. and Dick, G. F. Pancreatic function in a case of nontropical sprue. *Arch. Int. Med.* 66:833-847, 1940.
4. Allen, J. G., Julian, O. C. and Dragstedt, L. R. The use of serial dilutions in the determination of prothrombin by the one stage technique. *Arch. Surg.* 41:873-878, 1910.
5. Nielsen, C. personal communication.
6. Binkley, S. B., Cheney, L. C., Holcomb, W. F., McKee, R. W., Thayer, S. A., MacCorquodale, D. W., and Doisy, E. A. The constitution and synthesis of vitamin K. *J. Am. Chem. Soc.* 61:2558, 1939.
7. Stewart, J. D. and Rourke, G. M. Control of prothrombin deficiency in obstructive jaundice by use of vitamin K. *J. A. M. A.* 113:2223-2227, 1939.
8. Allen, J. G. and Julian, O. C. Clinical use of a synthetic substance resembling vitamin K (2-methyl-1, 4-naphthoquinone). *Arch. Surg.* 40:912-916, 1910.
9. Hanes, F. M. Sprue. *Christian's Oxford Medicine*. Volume 5. Chapter 27. New York, Oxford University Press, 1936. Pp. 631-655.
10. Fernholz, E. and Ambacher, S. Vitamin K activity of synthetic phthiocol. *Science* 90:215, 1939.

THE SYMPTOMATIC TREATMENT OF FUNCTIONAL DYSMENORRHEA BY AMPHETAMINE (BENZEDRINE) SULFATE*

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IN A practice including a high percentage of young women patients, the problem of the treatment and management of dysmenorrhea becomes extremely important. In some cases painful menstruation is a sign of underlying organic disease or hormone dysfunction. However, there remain a certain number of sufferers from dysmenorrhea in whom careful gynecologic examination and laboratory investigation reveal no such cause. The pain is often so severe that bed-rest during part of each menstrual period becomes necessary. In such cases the efficiency of the patient is markedly reduced, not only by pain but also by the marked depression that is usually a factor. This psychologic component of dysmenorrhea is also usually found in cases in which abnormal conditions are present in the uterus or in its nerve supply. Although the pain can to some

extent be controlled by salicylates or codeine, the treatment by such methods has not been entirely satisfactory in controlling the depression, fatigue and inertia.

It was thought possible that a therapeutic agent causing relaxation of smooth muscle in general, and at the same time an increase of the sense of well-being, might be of value in the treatment of functional dysmenorrhea. For this reason amphetamine (Benzedrine) sulfate was tried.

Halpern¹ showed that amphetamine sulfate could be considered a physiologic antagonist of such spasmogenic drugs as acetylcholine and pilocarpine when acting on the uterus of the rabbit. Boyd,² on the other hand, presented evidence that on isolated uterine muscle of the rabbit, amphetamine sulfate produced increasing contraction. Hundley et al.³ found that the drug contracted uterine muscle strips in the guinea pig but relaxed them in the rabbit, and that whether it was injected

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into living persons or applied to surviving human uterine muscle strips, the predominant effect was an increase of uterine tone and a diminution of the amplitude of contractions.

Bakacs,⁴ who treated climacteric symptoms with amphetamine sulfate, reported improvement of menstrual disorders in certain cases. Hundley et al.³ had good results administering 10 to 20 mg. amphetamine sulfate to relieve attacks of primary dysmenorrhea in a series of 91 working girls.

Since amphetamine sulfate has been successfully used for dysmenorrhea in the author's practice for three years, it seemed interesting to publish the records of 4 typical cases that were thoroughly studied and controlled. The cases were chosen from a series of 34, and were the most serious seen during the three-year period of observation.

METHOD

A complete medical history was obtained and a physical examination made in each case, and 3 patients were referred to consulting gynecologists. In no case was any underlying gynecologic disorder responsible for the dysmenorrhea. Glandular dysfunction and organic lesions, when present, were treated appropriately before beginning treatment with amphetamine sulfate.

The patients were given three trial doses of 2.5, 5.0 and 10.0 mg. amphetamine sulfate during intermenstrual periods, and were observed for an hour in order to determine whether or not any sensitivity to the drug or untoward reactions would occur. A sufficient quantity of the drug for the next menstrual period was then given, without comment on the nature of the medication. The patients were instructed to take 10 mg. (one tablet) of amphetamine sulfate before breakfast for two days before the expected period and including the day of the period, and to repeat the dose if the pain was not relieved. They were not permitted to take more than 20 mg. a day, or to take the second tablet after 2 p. m., without advice from the physician. The treatment lasted three or four days, depending on the expected duration of symptoms. On alternate periods the patients were given placebos or analgesics (salicylates or codeine), but they did not know what medication they were receiving. No leading questions were asked, but the patients were asked to describe the symptoms at each menstrual period. The various findings were later correlated.

CASE REPORTS

CASE 1. A 27-year-old patient stated that her periods began at the age of 12 and recurred regularly every 28 days, lasting 2 or 3 days and requiring one or two pads a day. From the onset there were symptoms of dysmenorrhea,

with marked aggravation since 1926, the year before her marriage. The dysmenorrhea usually started 1 week before the period, confined the patient to bed until the flow had ceased and was characterized by severe low abdominal and back pain, bearing-down in nature but without radiation and without leukorrhea or intermenstrual bleeding. The condition was complicated by an anxiety depression, with financial worries, which resulted in maladjustment.

The patient was married in 1927. In May, 1931, a normal-sized baby was delivered by cesarean section, necessitated by the presence of a small pelvis. Pregnancy had been difficult.

In June, 1935, the patient complained of constant pressure and a heavy feeling in the pelvis, for which she was treated by douches and tamponage. The next two periods were unusually profuse, suggesting the possibility of endometriosis, but this was not found by the gynecologist to whom she was referred.

Examination in January, 1936, revealed a marked hypochromic anemia and hyperthyroidism, with a basal metabolic rate of +39 per cent. Thyroidectomy was performed in March, after which the basal metabolic rate fell to normal and the symptoms of hyperthyroidism disappeared. The anemia was successfully treated with ferrous sulfate.

The dysmenorrhea was not in any way relieved by pregnancy or by thyroidectomy, and menstrual pain was the chief complaint. The patient was referred for complete gynecologic examination, but no positive findings were obtained. Administration of 2000 international units of Theelin daily for five months, beginning in January, 1937, caused no improvement. Analgesics were also ineffective, and the patient became more depressed with each period.

Amphetamine sulfate therapy was begun in December, 1937. A dose of 10 mg. gave marked relief of pain and a general increase in the sense of well-being, but it was found that repetition of the dose 3 hours later gave even better results. The patient remained in bed for 2 or 3 hours after taking the drug, and was then able to get up and to carry on her work, both as a housewife and as a saleswoman. The medication has been uniformly successful for 2 years. The substitution of placebos or salicylates always resulted in a return of the original symptoms of pain, depression and incapacity.

CASE 2. A 16-year-old single girl reported that menstruation started at the age of 14 with a normal amount of flow, usually lasting 3 or 4 days. Dysmenorrhea began at the onset of each period, with lumbar and low abdominal pain that was bearing-down and cramplike in character and radiated down both legs. Each attack was associated with nausea and vomiting, chills and a clammy skin with marked pallor. The patient had what appeared to be a marked vasomotor reaction with each period and was always confined to bed during the 1st day.

Physical examination and history were essentially negative, aside from a slightly masculine distribution of hair and the complaint of dysmenorrhea. In view of a basal metabolic rate of -10 per cent, the patient was given 2 gr. of thyroid daily for a period of 4 months. This therapy diminished the nausea and vomiting and also relieved the cramps to a certain extent, but the relief was not sufficient to enable her to be up during the 1st day of her period.

Thyroid was discontinued in September, 1938. Ten milligrams of amphetamine sulfate was given daily from the expected onset of menstruation until the morning of the 2nd day of the period. There was almost complete relief from all symptoms, except when menstruation started before the amphetamine sulfate was given, but at such times the drug brought complete relief. The nausea and

vomiting and the peculiar skin sensations were completely abolished, and the patient was able to go to school without interruption. When placebos, salicylates or codeine were substituted, all the symptoms returned. The medication has continued for a year, with no signs of tolerance. Thyroid was later added to the treatment because of evidence of mild hypothyroidism. During the last two months the patient has received a combination of thyroid and amphetamine sulfate, beginning one week before the expected period, with excellent results.

CASE 3. The menstruation of a 32-year-old married woman began at the age of 11 and recurred every 30 days with a normal amount of flow. Dysmenorrhea, characterized by severe low abdominal pain, appeared at the onset of the menses, and necessitated bed rest the first half-day of the period. When dysmenorrhea did not occur there was an attack of migraine for 2 days previous to the onset of menstruation. During all periods the patient felt uncomfortable and markedly depressed and fatigued. Pregnancy 3 years before the first visit had brought no relief of the dysmenorrhea, although codeine alleviated the pain to some extent.

Physical and gynecologic examinations were essentially negative, except for the presence of a small fibroid.

Amphetamine sulfate was found to give relief from pain and depression, beginning a half-hour after ingestion and becoming complete in 2 hours. Five to 7.5 mg. were sufficient in this case, whereas 15 mg. or more occasionally produced tachycardia which lasted for 30 minutes. Substitution of placebos resulted in the return of the symptoms.

CASE 4. The onset of the menses in a 17-year-old girl was at 14 years, and they recurred at intervals of 4 to 5 weeks thereafter. The amount and duration of the flow were normal. There was dysmenorrhea from the beginning, occurring 2 or 3 days prior to the period, with generalized aching and low abdominal pain and with nausea and vomiting on the 1st day of the flow. The pain lasted about 2 days, but usually recurred on the 5th or 6th day. There was no constipation, but usually a looseness of the bowel movements. Soreness of the breasts was present just before the period. The pain and depression obliged the patient to remain away from school during attacks.

Physical and gynecologic examinations were essentially negative except for the presence of a femoral hernia, which gave little difficulty.

A daily dose of 5 mg. of amphetamine sulfate was sufficient to control all symptoms in this patient, enabling her to attend school without interruption for 6 months, except when incapacity resulted from the substitution of placebos.

The observations included a group of 30 additional patients. Of these, 20 were studied for a period of four months or more. In 4 cases dysmenorrhea did not occur while under medication, and 7 patients reported complete relief of symptoms within 2 hours of taking the drug. Twelve patients reported marked relief of symptoms and an increased sense of well-being, and 5 reported that the relief was not sustained; 2 believed that their symptoms were, if anything, worse.

In the total group of 34 patients there were only two untoward reactions. The first was a manic phase induced by a test dose of 5 mg. of the drug in a patient who later was proved to have a manic

depressive psychosis. The second was in a patient with anxiety neurosis who refused medication because palpitation occurred with the test dose. In the entire series there was no indication of tolerance or habit formation. No patients expressed a desire for the drug in intermenstrual periods.

Amphetamine sulfate was not observed to have any effect on the amount of menstrual flow.

DISCUSSION

Amphetamine sulfate is not suggested as a remedial measure for dysmenorrhea in the presence of underlying pathologic conditions. Prior to any symptomatic treatment, competent gynecologic examination should of course be made, and indicated measures taken; when a positive diagnosis of endocrine dysfunction is made, appropriate therapy should be undertaken. But it is significant that the symptoms of dysmenorrhea often fail to yield to such treatment. An example is seen in Case 1. This patient was generally benefited by thyroidectomy and Theelin medication, but the dysmenorrhea was not relieved. The symptomatic improvement must be attributed to one or more of the various effects of the drug, that is, improvement of mood, relief from fatigue and relaxation of smooth muscle. The implication is that cases of essential dysmenorrhea have too frequently been ascribed to some unspecified endocrine imbalance, whereas endocrine disorders and essential dysmenorrhea should be treated independently.

It is impossible to determine what part was played by the relief of spasm and pain through the relaxation of smooth muscle, but it seems probable that the disappearance and prevention of abdominal pain may be partly attributed to this effect of the drug.

The most demonstrable value of amphetamine sulfate was in the relief of depression and fatigue. This effect may in turn have favorably influenced other symptoms, such as nausea, which are often psychogenic. That this effect was real, and not imaginary, is proved by the fact that substitution of placebos never failed to cause a recurrence of the symptoms.

Objections to this treatment in ambulatory patients are based on the possibility of reactions, tolerance and habit formation. Reactions were forestalled by test doses, and in the rare cases in which they occurred subsequently, could be controlled by reducing the dose. Tolerance was not developed, nor could it be expected under spaced medication of this type: the dosage never had to be increased during the three years of the experiment. Medication was never requested during intermenstrual periods; the patients in whom fa-

avorable responses were obtained wanted the drug for its specific effect in relieving their symptoms, but never seemed desirous of obtaining the euphoric effect when it was not recommended for their condition.

SUMMARY AND CONCLUSIONS

Amphetamine (Benzedrine) sulfate, in doses of 5 to 20 mg. a day, was used in the treatment of 34 cases of essential dysmenorrhea. Four of these were studied in detail. It was found that the drug relieved pain, fatigue and depression in cases in which other measures had failed. This finding was confirmed by the substitution of placebos or other medication during alternate periods. The rationale of the therapy is discussed.

In the 30 additional cases, 40 per cent obtained complete relief and an equal number moderate relief. In 16 per cent the apparent benefit of the drug was not maintained, and in 2 cases (6 per cent) the patients reported that they were worse under medication.

It is concluded that amphetamine sulfate is a valuable drug for the treatment of dysmenorrhea and that it is well adapted to ambulatory patients.
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REFERENCES

1. Halpern, B. N. Action du sulfate de phenyl-1-amino 2 propine sur quelques organes à muscles lisses. *Compt. rend. Soc. de Biol.* 128 487-491, 1938
2. Boyd, E. M. The effect of benzedrine sulphate on the bowel and uterus. *Am. J. M. Sc.* 155:445-448, 1938.
3. Hundley, J. M., Jr., Krantz, J. C., Jr. and Hibbits, J. T. Dysmenorrhea — including clinical and pharmacological studies on benzedrine sulfate. *M. Clin. North America* 23:273-293, 1939.
4. Bakács, G. Behandlung klimakterischer Symptome mittels *a* phenyl *B*-isopropylamin-hydrophosphat. *Zentralbl. f. Gynäk.* 62:1893-1898, 1938.

MEDICAL PROGRESS

MEDICAL ASPECTS OF OBSTETRICS

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DURING the last twelve months various contributions to the literature dealing with the medical phases of obstetrics have appeared. As usual, the knowledge of such progress as has been made must be gleaned from observations and opinions, which at times confirm and at other times refute observations previously made and opinions previously expressed.

The toxemias of pregnancy have claimed their usual share of attention, with a continuing contest between etymologists and etiologists concerning a proper system of nomenclature. The latter school of thought contend that the very existence of so-called "toxemia of pregnancy" is doubtful. Peters et al.^{1,2} state that toxemic pictures may resemble all the disorders that outside of pregnancy give rise to arteriolar disease, hypertension and functional impairment of the kidneys. Pyelitis, in their opinion, plays an important part because the physiologic hydronephrosis of pregnancy renders infection particularly malignant. According to them, women who have pyelitis when pregnant seldom escape irreparable and enduring damage if the pregnancy is allowed to continue. In support of this belief they report finding among 93 women with pyelitis as a complication of pregnancy 25 cases of hypertension or edema or both before pregnancy was terminated. Weiss and Parker³

conclude that chronic pyelonephritis results in the gradual diminution of kidney structure and in decreased renal function, and state that patients who have had pyelonephritis in early childhood show a marked tendency to develop a certain type of toxemia.

The role of renal damage from a pre-existing pyelitis or pyelonephritis in the etiology of the toxemic syndrome is discussed by Crabtree and Reid.⁴ These authors consider that early interruption of pregnancy because of the occurrence of pyelitis or pyelonephritis, as advocated by Peters, requires further investigation before being accepted. They report a series of 45 cases of pregnancy pyelonephritis in which the infection had occurred from five to ten years before the investigation was undertaken. In their conclusions they state that data have not yet been produced to indicate to what extent pyelonephritis of pregnancy shortens life; though in many cases it is a progressive disease, and though a high percentage of patients suffer appreciable damage to their kidneys, which is demonstrable from five to ten years after the infection, they believe that sufficient evidence has been produced to indicate that the aim in treatment in pyelonephritis associated with pregnancy should be to minimize the initial injury and clear the infection as soon as possible.

Mussey and Lovelady⁵ review the relations of urinary infection to toxemia, comparing a series of 117 proved cases of pyelitis complicating preg-

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nancy with a series of 163 cases of acute hypertensive toxemia of late pregnancy. Ninety-two patients in the former group showed pyelitis during pregnancy, 25 in the puerperium. In 3 patients, pyelitis of pregnancy was followed or accompanied by the development of acute toxemia. One patient with fulminating pyelonephritis died of acute renal failure probably associated with cortical abscesses, permission for necropsy was not obtained, and it is debatable whether or not this case should be classed as a true pre eclamptic toxemia. None of the 163 patients in the toxemic group gave a history of pyelitis prior to the first pregnancy, 10 of 6 cases pyelitis developed during the puerperium. The authors conclude that acute pyelitis of pregnancy when treated promptly is not prone to cause pre eclamptic toxemia, and that following one attack of acute pyelitis of pregnancy the majority of such women do not exhibit symptoms of residual renal damage.

Such studies as those quoted in the two preceding paragraphs are in no sense contradictory to the findings of Peters and of Weiss and Parker that renal damage found at autopsy may frequently be traceable to a previous severe or long standing infection. In fact they show, by clinical observation, that functional damage to the renal and vascular systems occurs following a certain proportion of cases of pyelitis and pyelonephritis. To date, however, they have not proved that these conditions are certain to cause renal damage within the space of the childbearing period of life, or that the occurrence of pyelitis or pyelonephritis in pregnancy is per se an indication that interruption of the pregnancy is indicated as the cardinal treatment to be employed.

Tenney and Parker⁶ take issue with the usually accepted belief that hypertension, edema and albuminuria occurring in a pregnant woman necessarily justify a diagnosis of toxemia. They maintain that true toxemia, whether or not there is underlying or pre existing hypertension or renal disease, can be accurately judged by certain changes in the placenta, which they describe as widespread hyaline syncytial degeneration associated with marked villous congestion. This claim leaves the clinician in a dilemma when he is confronted with a pregnant woman presenting the aforesaid triad of hypertension, edema and albuminuria. Since, according to this concept, the means of diagnosing true toxemia—to wit, the placenta—is unavailable until after the uterus has been emptied by natural or induced means, the primary diagnosis seems to be narrowed down to a choice between hypertensive disease and renal disease, neither of which can be proved without

prolonged study and observation, unless one is to postulate the existence of false as well as true types of toxemia. Further discussion along this line, however, might become Gilbertian, since the term "toxemia" still eludes concrete definition, useful though it may be as the name of a syndrome.

Despite controversy as to etiology, the etymologists have not been entirely inactive. Wellen⁷ discusses a workable classification for the so-called "toxemias of pregnancy" that differs only in slight detail from the classification agreed on by a subcommittee of the American Committee on Maternal Health. The latter includes the following headings: vomiting of pregnancy, acute yellow atrophy of liver, eclampsia, severe pre eclampsia, mild pre eclampsia, hypertensive disease, and renal disease. To this classification Stander,⁸ previously a formulator of the Johns Hopkins classification, which was partially discussed in this review⁹ in 1939, has given approval, correlating his original concept of low reserve kidney with mild pre eclampsia and hypertensive disease, and his original grouping of chronic nephritis with hypertensive disease and renal disease.

Reid and Teel¹⁰ have contributed an article dealing with cardiac asthma and acute pulmonary edema complicating the toxemias of pregnancy, complementary to an article on the same subject published by the same authors and Hertig¹¹ in 1937. They find that both toxemic patients with previously normal vascular and renal systems and those with antecedent hypertension may have paroxysmal attacks of cardiac asthma with acute pulmonary edema; they attribute these conditions to sudden left-ventricular failure. Therapy consists in large doses of morphine with venesection, or in peripheral venostasis when indicated by severe pulmonary edema, followed by rapid digitalization and dehydration, and delivery within a few days after the attack has been controlled. The authors also believe that the distressing pulmonary edema often encountered in severe and fatal eclampsia is a result of acute left-ventricular failure; for this reason rapid and full digitalization of all eclamptic patients is indicated.

For the treatment of eclampsia, veratrum viride has been reintroduced, this time from the Ohio Valley. In 1935 Bryant,¹² of Cincinnati, reported a series of 121 consecutive cases treated with this drug, with 12 deaths, a mortality of 10 per cent. During the last year Bryant and Fleming¹³ have published a new series of 120 cases thus treated, 54 of which had been included in the 1935 paper, two deaths occurred, a mortality of 2 per cent. In addition to veratrum viride, however, which serves as a vasodilator, slowing the pulse and lowering

the blood pressure, the authors advocate the administration of 10 cc. of 50 per cent magnesium sulfate by deep injection immediately after the condition is recognized, followed by 5 cc. every six hours for four doses and by 5 cc. every twelve hours thereafter for four more doses; this drug they consider to have a dehydrating and diuretic action. In July, 1940, treatment with veratrum viride was instituted at the Boston Lying-in Hospital, with the intention of using this drug, if feasible, without the synergistic action of magnesium sulfate, according to the standard recommended by the Cincinnati investigators, *viz.*, 10 minims at once, repeating the dose every ten or fifteen minutes until the pulse rate is below 60 or the systolic blood pressure below 120; thereafter repeating in doses of 3 to 10 minims if the pulse rate exceeds 80 or the blood pressure rises above 150 systolic. To the date of publication of this report, however, insufficient evidence has accrued locally to render a judgment as to the results to be expected.

Progress in the employment of chemotherapy for puerperal and postabortal infection has been reported from various sources. Gordon and Rosenthal¹⁴ investigated 27 new cases of severe puerperal infection; 21 showed clinical response to sulfanilamide therapy, 5 gave a doubtful response and 1 gave no response. They state that sulfanilamide therapy in severe infections need not wait upon bacteriologic investigation, yet this information is of importance in deciding whether the drug should be continued in the absence of favorable clinical response. So far as these authors know, all strains of Group A streptococcus respond to sulfanilamide, but evidence in the cases of infection by anaerobic streptococci, *Streptococcus viridans*, nonhemolytic streptococci, staphylococci and colon bacilli is inconclusive.

Rosenthal and Stone¹⁵ reporting 2 cases of vegetative endocarditis due to hemolytic streptococci (Groups B and C), one postabortal and the other probably postpartal, found that massive sulfanilamide therapy failed in both cases, and that experiments in vitro and in vivo indicated the drug had little effect on these strains.

These observations bear out reports from other sources, both obstetric and nonobstetric, that sulfanilamide has its greatest value in the treatment of infections with the Group A hemolytic streptococcus. They add evidence to previous experience that bacteriologic control is necessary if the best results are to be expected from chemotherapy. Sulfanilamide may properly be used in severe infections pending bacteriologic confirmation of the identity of the organism involved, and may be

continued if culture shows the organism to be of a type against which the drug has been shown to have therapeutic value, especially the Group A streptococcus, or, despite the doubts of Gordon and Rosenthal,¹⁴ the colon bacillus. If an anaerobic streptococcus is shown to be the agent of infection, sulfanilamide is probably valueless; if the staphylococcus is found, sulfathiazole therapy promises much more favorable results.

Long et al¹⁶ have contributed a concise and informative article dealing with the toxic manifestations of sulfanilamide and its derivatives. Whereas heretofore the careful clinical and laboratory investigation of patients treated with sulfanilamide, sulfapyridine or sulfathiazole has been considered necessary, the authors are now willing to state that, with the exception of acute leukopenia, all the toxic manifestations of these drugs, which may occur in the first two weeks of therapy, can be recognized by careful clinical observation alone; therefore they believe that no physician need hesitate to administer the drugs in therapeutically adequate amounts, provided he can see his patient once a day. The requisite observations include the following:

Inquiry as to symptoms of headache or malaise, because these symptoms often precede toxic manifestations.

Examination of the scleras for jaundice, the mucous membranes for pallor and the skin for rash.

Checking of temperature to discover drug fever. If the patient complains of chills, it should be arranged to have the temperature recorded frequently.

No special precautions are required as to the urine when sulfanilamide is used. It should be measured by any household standard in all cases receiving sulfapyridine or sulfathiazole. In this way an oliguria may be detected before anuria develops. The urine should always be examined for gross blood, and the attendants should stop the drug and force fluids if oliguria develops or if the urine looks bloody.

Before instituting therapy it is important to ascertain whether the patient has taken sulfanilamide or a related drug before, and if so, whether it proved toxic. If a history of toxicity is obtained, it is best to give a small test dose (5 gr.) and to observe the patient closely before cautiously beginning chemotherapy.

This article is of considerable value in dispelling the natural uncertainty as to the advisability of chemotherapy when complete laboratory control is impossible or inexpedient. The observation of gross blood in the urine is misleading in postpartal or postabortal patients unless the specimen is obtained by catheter; hence under conditions of therapy in the home the fourth precaution mentioned by the authors above quoted may be difficult to fulfill in such cases. Fortunately, the greatest part of postpartal and postabortal sepsis is due to organisms for which sulfanilamide is indicated. The smaller group of cases in which sulfapyridine or

sulfathiazole is the agent of choice should be hospitalized, whenever possible, in the interests of better controlled observation and greater safety for the patient.

Perhaps the most publicized element of progress in the medical aspects of obstetrics during the last year has been the attention directed toward the use of vitamin K both prophylactically and therapeutically in hemorrhagic disease of the newborn.

It has long been recognized that a newborn in fact may exhibit a certain hemorrhagic tendency during the first week or two of life, which results in some cases in death from rapid exsanguination. Bleeding may occur from the umbilical cord, from the gastrointestinal tract, beneath the skin, from the urinary tract or into the cerebrospinal system. This syndrome, recognized clinically as hemorrhagic disease of the newborn, is separate and distinct in etiology from the hemophilic and purpuric types of diathesis, and its occurrence is limited predominantly to the first week, and practically always to the first two weeks of neonatal life. The only reasonably effective method of therapy known to date has been prompt transfusion with whole blood.

Evidence is rapidly accumulating that the blood of newborn infants shows a low level of prothrombin. Kato and Poncher¹⁷ give a historical résumé of prothrombin determinations, referring to the previous publications of Quick and Grossman,¹⁸ Brinkhous, Smith and Warner¹⁹ and others, which had demonstrated low prothrombin levels in the blood of newborn babies. Kato and Poncher report the prothrombin clotting time, by a micromethod that they describe, of 173 newborn infants, both mature and immature. In 100 mature infants the average time was 43.2 seconds on the first day of life, gradually shortening to 25.0 seconds by the tenth day. In 73 premature infants the average figure of 46.5 seconds was found on the first day.

Waddell and Lawson²⁰ have investigated 191 newborn infants, showing that the period of most marked prothrombin deficiency occurred at the ages of forty-eight and seventy-two hours. This is in accord with the common obstetric experience that the bleeding tendency in otherwise normal newborn infants is apt to manifest itself on the second or third day after delivery.

Rush²¹ compared the fibrinogen and prothrombin levels of samples of maternal and umbilical cord blood taken at the time of delivery of 18 patients with the values found in 6 normal persons. The fibrinogen level of cord blood was found to be normal, but the prothrombin content was reduced. Both the fibrinogen and pro-

thrombin contents of maternal blood at the time of delivery were found to be above normal. The conclusion reached was that the prolonged prothrombin clotting time of cord blood is not due to a deficiency of plasma fibrinogen. In a later article the same author, in collaboration with Norris,²² substantiates his previous findings concerning the respective prothrombin contents of maternal and cord blood.

Enough of the available evidence has been quoted in the preceding paragraphs to indicate the chemical background for the tendency of newborn infants to bleed. Hemorrhagic disease is thus seen to be a deficiency disease. If an antidote is available to make good the deficiency, its administration should prevent the condition from developing and should have therapeutic value against its manifestations if perchance it should develop. The evidence secured to date suggests that vitamin K is such an antidote.

Cheney²³ states that hemorrhagic disease of the newborn is one of two classes of disorders definitely associated with vitamin K deficiency that are benefited by vitamin K therapy. Waddell and Lawson,²⁰ reporting the findings in 181 infants treated with 0.5 cc. of natural vitamin K concentrate, or its equivalent in 2 methyl 1,4 naphthoquinone, immediately after birth and at the end of twenty-four and forty-eight hours, and comparing them with those obtained in 191 control infants, conclude that such a regime will give adequate protection against the physiologic prothrombin deficiency characteristic of newborn life. Fitzgerald and Webster²⁴ report a study to determine the effect of vitamin K administered to women in labor. Fifty patients treated with oral Klotogen showed a definite rise in their prothrombin levels at the end of labor; there was also a definite rise in the average level of prothrombin in the cord blood. The same findings were obtained in 19 patients to whom the authors administered synthetic Vitamin K intravenously. A series of 20 cases in which sodium pentobarbital was given as an analgesic showed a definite depression of the prothrombin levels of both mothers and infants.

Hellman, Shettles and Eastman,²⁵ publishing a review of one year's experience with vitamin K in obstetrics, state that the plasma prothrombin level of the newborn infant can be raised severalfold by administering vitamin K to the mother antenatally, even when it is given as late as four hours before delivery; and that although the feeding of vitamin K to the baby after birth also increases its prothrombin concentration, the levels reached are not so high as those achieved by antenatal ad-

ministration to the mother. Comparing a series of 384 cases in which each mother was given 2 mg. of 2-methyl-1,4-naphthoquinone orally during labor with a control series not so treated, the authors determined that the incidence of thrombophlebitis in the mothers was not increased (owing to the increased plasma prothrombin) in the treated cases, and that the giving of vitamin K had no effect on maternal blood loss. Concerning the infants born in the two series, the former, treated with vitamin, showed 6 deaths, a mortality of 1.5 per cent; the latter, or control series, showed 16 deaths, a mortality of 4.1 per cent. Only 1 fatal case in the treated series showed hemorrhage (sub-arachnoid) at autopsy, whereas 9 of the 16 fatal cases in the control series showed hemorrhage at autopsy, 3 of which were cerebral, and 1 of which showed the classic syndrome of hemorrhagic disease of the newborn.

The following well-founded deductions are indicated in the authors' study:

Hemorrhagic diathesis in the newborn represents simply an extreme degree of hypoprothrombinemia which all newborn infants exhibit to a certain extent and in various gradations.

Unless the plasma prothrombin level is extremely low, this hypoprothrombinemia may be without clinical manifestations.

If birth trauma, anoxia and other causes of bleeding are superimposed upon it, this prothrombin lack must necessarily play a part in the duration and therefore in the extent of the bleeding.

It seems that routine antenatal administration of vitamin K, properly timed, and with suitable dosage, will well-nigh eliminate so-called "hemorrhagic disease of the newborn." Certain types of cerebral hemorrhage, particularly small hemorrhages that ooze for a number of days, may be preventable by this procedure.

The trend of recent reports, therefore, indicates that vitamin K concentrate, or the synthetic substance, 2-methyl-1,4-naphthoquinone, is a promising agent to be used in the effort to reduce mortality among newborn infants. As stated by the Baltimore investigators, the triad of anoxia, trauma and hypoprothrombinemia must be considered as malignantly allied factors in the causation and

outcome of every case of bleeding in the newborn, whether cerebral or otherwise; and the hypoprothrombinemia is the one factor in this triad that is subject to prophylactic correction. From the therapeutic angle, however, the relative efficacy of administration of vitamin K and of transfusion of whole blood in cases of clinically evident hemorrhagic disease awaits elucidation.

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REFERENCES

1. Peters, J. P., Lavietes, P. H. and Zimmerman, H. M. Pyelitis in toxemias of pregnancy. *Am. J. Obst. & Gynec.* 32:911-927, 1936.
2. Peters, J. P. The nature of the toxemias of pregnancy. *J. A. M. A.* 110:329-331, 1938.
3. Weiss, S. and Parker, F., Jr. Vascular changes in pyelonephritis and their relation to arterial hypertension. *Tr. A. Am. Physicians* 53:60-73, 1938.
4. Crabtree, E. G. and Reid, D. E. Pregnancy pyelonephritis in relation to renal damage and hypertension. *Am. J. Obst. & Gynec.* 40:17-30, 1940.
5. Mussey, R. D. and Lovelady, S. B. Is there a clinical relationship between pyelitis of pregnancy and pre-eclamptic toxemia? *Am. J. Obst. & Gynec.* 39:236-242, 1940.
6. Tenney, B., Jr. and Parker, F., Jr. The placenta in toxemia of pregnancy. *Am. J. Obst. & Gynec.* 39:1000-1005, 1940.
7. Wellen, I. Specific "toxemia," essential hypertension, and glomerulonephritis associated with pregnancy. *Am. J. Obst. & Gynec.* 39:16-24, 1940.
8. Stander, H. J. General considerations of toxemias of pregnancy. *Texas State J. Med.* 35:270-278, 1939.
9. Goethals, T. R. Medical aspects of obstetrics. *New Eng. J. Med.* 220:198-203, 1939.
10. Reid, D. E. and Teel, H. M. Cardiac asthma and acute pulmonary edema complicating toxemias of pregnancy. *J. A. M. A.* 113:1628-1631, 1939.
11. Teel, H. M., Reid, D. E. and Hertig, A. T. Cardiac asthma and acute pulmonary edema: complications of non-convulsive toxemia of pregnancy. *Surg., Gynec. & Obst.* 64:39-50, 1937.
12. Bryant, R. D. Veratrum viride in the treatment of eclampsia. *Am. J. Obst. & Gynec.* 30:46-53, 1935.
13. Bryant, R. D. and Fleming, J. G. Veratrum viride in the treatment of eclampsia. *J. A. M. A.* 115:1333-1339, 1940.
14. Gordon, C. A. and Rosenthal, A. H. The use of sulfanilamide in obstetrics and gynecology. *Am. J. Obst. & Gynec.* 40:211-218, 1940.
15. Rosenthal, A. H. and Stone, F. M. Puerperal infection with vegetative endocarditis. *J. A. M. A.* 114:840-843, 1940.
16. Long, P. H., Haviland, J. W., Edwards, L. B. and Bliss, E. A. The toxic manifestations of sulfanilamide and its derivatives. *J. A. M. A.* 115:364-368, 1940.
17. Kato, K. and Poncher, H. G. The prothrombin in the blood of newborn mature and immature infants as determined by micro prothrombin test. *J. A. M. A.* 114:749-753, 1940.
18. Quick, A. J. and Grossman, A. M. Prothrombin concentration in newborn. *Proc. Soc. Exper. Biol. & Med.* 41:227, 1939.
19. Brinkhous, K. M., Smith, H. P. and Warner, E. D. Plasma prothrombin level in normal infancy and in hemorrhagic disease of the newborn. *Am. J. M. Sc.* 193:475-480, 1937.
20. Waddell, W. W., Jr. and Lawson, G. McL. Hemorrhagic diathesis of the newborn. *J. A. M. A.* 115:1416-1421, 1940.
21. Rush, A. A comparison of the fibrinogen and prothrombin levels of maternal and cord blood at delivery. *Surg., Gynec. & Obst.* 70:922-924, 1940.
22. Norris, R. F. and Rush, A. A comparison of the prothrombin level of maternal and cord blood at delivery. *Surg., Gynec. & Obst.* 70:1006-1010, 1940.
23. Cheney, G. The clinical value of vitamin K. *J. A. M. A.* 115:1032-1037, 1940.
24. Fitzgerald, J. E. and Webster, A. Effect of vitamin K administered to patients in labor. *Am. J. Obst. & Gynec.* 40:413-422, 1940.
25. Hellman, L. M., Shettles, L. B. and Eastman, N. J. Vitamin K in obstetrics. *Am. J. Obst. & Gynec.* 40:844-853, 1940.

**CASE RECORDS OF THE
MASSACHUSETTS GENERAL HOSPITAL**ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor***CASE 27051****PRESENTATION OF CASE**

A sixty-four-year-old man entered the hospital complaining of three attacks of upper abdominal distress.

Eight years before entry the patient had an attack of upper abdominal discomfort associated with general malaise, anorexia, nausea and vomiting. This lasted for four days, and gall-bladder studies at this time revealed a functioning gall bladder with a haziness of the shadow, "suggestive of sand." Except for slight gaseous eructation he was well until three years prior to admission, when he had a similar attack, which lasted for three weeks. X-ray studies were similar to those taken five years previously. At no time was there fever, jaundice or a change in the character of the stools. The third attack occurred six weeks prior to entry, and for the first time the patient noticed tenderness in the right upper quadrant of his abdomen. X-ray examination at this time showed an unusually large gall bladder filled with dense dye. There was an irregular-shaped area of calcification floating in the gall bladder, which sank to the bottom of the gall bladder in the upright position. There was no definite change in the size of the gall bladder after a fatty meal. Films of the gastrointestinal tract showed a small adhesive diverticulum in the middle third of the esophagus. The stomach showed no abnormalities; the pylorus opened readily. The duodenal cap showed marked swelling of its folds, but a definite crater was not demonstrable. There was no constant narrowing of the cap, and the remainder of the duodenum appeared normal. An x-ray film of the chest showed the diaphragm to be low in position, but normal in outline, with normal respiratory excursion. The heart shadow was slightly prominent in the region of the left ventricle; the aorta was slightly tortuous. The lung roots were normal in width and density, and the apical and peripheral portions of the lungs were clear. The lung markings in the basal portions were slightly prominent. An electrocardiographic recording showed normal sinus rhythm with a rate of 78, a PR interval of 0.16 second and a QR interval of 0.08 second; T₁ and T₂

were upright, T₃ flat and T₄ upright; left-axis deviation was well marked.

The upper abdominal discomfort and anorexia were still present at the time of admission. The patient lost 6 to 8 pounds in weight. In the past he had had frequent sore throats.

On examination the throat was reddened and edematous. Examination of the heart and lungs was negative; the blood pressure was 132 systolic, 72 diastolic. A definite sense of resistance with mild tenderness was present in the right upper quadrant of the abdomen.

The temperature, pulse and respirations were normal.

Examination of the urine was essentially negative. Examination of the blood showed a red-cell count of 5,100,000 with a hemoglobin of 17.5 gm. (photoelectric cell technic), and a white-cell count of 15,600 with 78 per cent polymorphonuclears. The nonprotein nitrogen of the blood serum was 20 mg. per 100 cc., the serum protein 6.4 gm. per 100 cc., and the chloride 115.5 milliequiv. per liter.

On the third hospital day an operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. F. DENNETTE ADAMS: Customarily when I receive one of these protocols I spend hours trying to make a diagnosis. In this case I have spent even more time trying to avoid making one. At first glance this appears to be a simple case of gall-bladder disease—three attacks of upper abdominal distress with anorexia, nausea and vomiting, the last accompanied by tenderness and resistance in the right upper quadrant and presumptive roentgenologic evidence of stone in the gall bladder.

Yet a more careful analysis of the record introduces a not inconsequential element of doubt. The patient had very little discomfort in the first and second attacks. In none of the three was there pain characteristic of gallstone colic. Nor was there fever, pronounced tenderness or any other indication of acute gall-bladder infection. During the eight-year period he was always quite well between attacks. Complete interval freedom from symptoms is not inconsistent with chronic cholecystitis, yet a gall bladder diseased enough to cause three definite episodes might well be expected to create during the intervals at least a few spells of vague indigestion, flatulence or other minor digestive complaints. In the third attack the tenderness and resistance, in addition to the subjective symptoms, incline one to the diagnosis of gall-bladder disease, and in the pres-

ence of a positive roentgenogram, I should make that diagnosis.

But the roentgenologist's report clouds the issue. Before I ask Dr. Hampton to show the films let me speculate for a moment: the gall-bladder shadow is said to be large. A large gall bladder almost invariably results from one of two disorders—acute cholecystitis, especially when it is associated with stone in the cystic duct, a condition in which one expects definite systemic reaction, acute pain and tenderness, or tumor of the head of the pancreas or some other obstructive lesion (other than stone) of the common bile duct. Here progressive jaundice is the rule. In neither condition would one expect the gall bladder to fill with dye. It is impossible for me to explain to my satisfaction both adequate filling and enlargement of the gall bladder. They seem almost paradoxical. I hesitate to suggest that the films were wrongly interpreted, yet with due respect to our roentgenologists the fact remains that such unhappy circumstances can occasionally occur. A year or so ago on this same rostrum I attempted to account for an abdominal tumor reported by the roentgenologist, only to learn from Dr. Mallory that no tumor was found at autopsy. Perhaps Dr. Hampton can help us out with these films.

DR. AUBREY O. HAMPTON: Apparently the radiologist was interested in the duodenum, because he took an enormous number of films. I must say that in most of them the duodenum does not look very normal. There is not much doubt that the mucosa of the duodenum is thickened, but when it is filled completely it is smooth in outline. Here is one spot film that shows a little fleck of barium in the cap that might be something abnormal. This is the gall bladder. It is large and stays that way in all the films, and this shadow within it shifts in position, but remains in the gall-bladder shadow. I think that there is evidence of gall-bladder disease, with a stone, and that for some reason or other the gall bladder is dilated. I also happen to know the diagnosis in this case and cannot answer too many questions, but the radiologist asked for a re-examination of the duodenum because he was not satisfied.

DR. ADAMS: After viewing the films I must concede that the gall bladder is both well filled and large, but I do not know why. Nor can I account for the abnormality of the duodenum; the picture is not that of the secondary changes resulting from gall-bladder disease. One must therefore either disregard the gall-bladder enlargement and make a diagnosis of simple chronic cholecystitis with stone or, if one insists on accounting for the gall-bladder enlargement, conclude that

something may be partially obstructing the cystic duct. Perhaps that something is related to the duodenum. At any rate I believe that the roentgenologic findings in the duodenum cannot be thrown aside. The evidence is far from clear cut, but tumor may be found.

DR. WILLIAM B. BREED: May I ask Dr. Hampton about the Graham test when there is a stone obstructing the cystic duct?

DR. HAMPTON: There should be no increase in density because, of course, no dye enters the gall bladder. It is true, though, that a dilated gall bladder due to cystic-duct obstruction is sometimes visible on a plain film. I should think it would not be so dense as this one. I think that this gall bladder had dye in it, and that the cystic duct was open.

DR. ADAMS: Needless to say, the diagnosis of simple gall-bladder disease is one that I am trying to escape. I am not willing to stand on that alone. The enlargement of the gall bladder still worries me, and so does the roentgenologist's report concerning the duodenum. I am therefore going to add carcinoma of the duodenum to the diagnosis of chronic cholecystitis with stone. The former is rare, I know, but this clinical picture is also rare.

DR. HENRY W. FAXON: Would you consider pancreatitis? He had stones, a high white-cell count and a great deal of nausea and vomiting.

DR. ADAMS: My impression is that pancreatitis is usually secondary to a stone lodged in the ampulla of Vater. There is no evidence of common-duct stone in this patient, so that, in my opinion, pancreatitis is automatically excluded.

DR. HAMPTON: Would you agree if the radiologist said that the patient had a duodenal ulcer?

DR. ADAMS: Without a more clear-cut history, I should agree only if the roentgenologist could demonstrate a crater.

DR. TRACY B. MALLORY: Dr. Smith, you speculated a great deal about this case. Will you express an opinion?

DR. WILLIAM D. SMITH: I did not believe that this patient could have a duodenal ulcer because I have never known anyone who grew up with fewer dyspeptic symptoms than this man had—practically none. As Dr. Adams said, the patient never had any severe pain, just a mild discomfort never sufficient to keep him awake. One night he woke up feeling a bit uncomfortable, and took a couple of drinks of whisky and went back to sleep.

DR. RICHARD H. SWEET: I was privileged to see this patient with Dr. Walter Bauer before operation, and to operate on him. We talked the history over very carefully. We took the x-ray films

down and went over them with Dr. Richard Schatzki, who took them. He was puzzled by the duodenal findings but made no diagnosis, and when we asked whether or not there was an ulcer he said he did not know. He suggested another x-ray film. Dr. Bauer and I concluded that since the patient had had several x-ray examinations, there was no point in further repetition.

I operated, expecting to find gallstones, which perhaps were causing the type of gastric symptoms that gallstones cause at times, although in this case they were a little severer than usual.

DR. ADAMS: Dr. Smith, what did you make of the large gall bladder?

DR. SMITH: I did not know. If it was a stone in a big gall bladder I wondered why it did not empty. I asked Dr. Hampton if it could be due to obstruction of the cystic duct, and he said that he thought it could not be.

DR. MALLORY: Dr. Sweet, will you describe the operative findings?

DR. SWEET: Our preoperative diagnosis was correct, but only partly so, as Dr. Adams intimated. We were very much astonished to discover that the undiagnosed aspect of the case was an acute, almost completely perforated, duodenal ulcer. It was covered with a sizable plaque of fibrin, which was the only thing that kept the contents of the stomach and duodenum from entering the peritoneal cavity. I should have guessed that if we had palpated the patient rather vigorously ahead of time, or if it had gone a few more hours, this ulcer would have perforated. He had a gallstone and a large gall bladder. We therefore opened the gall bladder, removed the stone, closed the bladder and directed our attention to the perforating ulcer.

DR. ADAMS: Was it posterior?

DR. SWEET: No, it was anterior. Dr. Bauer, Dr. Mallory and I discussed the situation and finally decided to perform a resection, which went very smoothly.

CLINICAL DIAGNOSES

Cholelithiasis.
Chronic cholecystitis.

DR. ADAMS'S DIAGNOSES

Cholelithiasis.
Chronic cholecystitis.
Carcinoma of duodenum?

ANATOMICAL DIAGNOSES

Acute perforating duodenal ulcer.
Cholelithiasis.

PATHOLOGICAL DISCUSSION

DR. MALLORY: One must examine the microscopic slide to convince oneself how near to perforation this ulcer was. There is a deep funnel-shaped defect in the wall of the duodenum, passing down through the mucosa, submucosa, muscularis, and even the serosa. At its base there is a layer of fibrin 1.5 mm. in thickness, and even with minute examination not a fibroblast is to be found. If another gastrointestinal series had been done and the duodenum vigorously palpated once more, acute perforation would almost certainly have resulted. A case of this type is perhaps hardly a fair one to put up for differential diagnosis. The important decision was whether and when to operate, and fortunately, it was correctly made.

DR. HAMPTON: I think that the reason the diagnosis was missed was that in the so-called "compression films" there was no compression. The crater would have shown up plainly if it had been compressed. Perhaps there was too much tenderness.

DR. ADAMS: Is Dr. Hampton able to explain the large gall bladder?

DR. HAMPTON: We have seen similar ones from time to time without stone or anything else to account for them.

CASE 27052

PRESENTATION OF CASE

A thirty-one-year-old housewife was admitted to the hospital complaining of pain in the right shoulder and cough.

For about four or five years before entry the patient had intermittent attacks of nagging pain in the right shoulder. At times she was unable to lie on her right side because of a sense of oppression. There was dyspnea with moderate exertion, and a slight degree of orthopnea. During the nine-month period preceding her entry there was a gradual loss of 25 pounds in weight. For three months there was a mild cough, which was worse in the morning shortly after arising and was productive of a small amount of yellowish-white sputum. Two months before entry "electric treatment" was administered to her shoulder by an "Indian doctor." Subsequently she felt very much improved, and the pain in the shoulder and dyspnea disappeared. The weight loss continued, however, and she developed a heavy sensation in the right dorsal region. She entered another hospital, where x-ray examination showed a tumor in the right chest. A right thoracentesis produced thick yellowish fluid.

The past history was noncontributory.

Physical examination showed a rather pale, thin young woman in no acute discomfort. The neck veins were distended. The left border of the heart extended 1 cm. beyond the left midclavicular line. The sounds were regular, and there were no murmurs. The blood pressure was 120 systolic, 80 diastolic. From the midaxillary line on the right to the midsternal line and extending from the third rib downward there were dullness to flatness and diminished voice sounds. Tactile fremitus

to the trachea in the lateral view. There were several plaques of calcification within its periphery. The heart was not displaced, and the mass could not be separated from the right cardiac border. Slight transmitted pulsation was evident. The right border of the heart was visible neither during fluoroscopy nor on the film. The superior mediastinum was distinctly widened, and its border was concave laterally. The remainder of the chest was not remarkable.

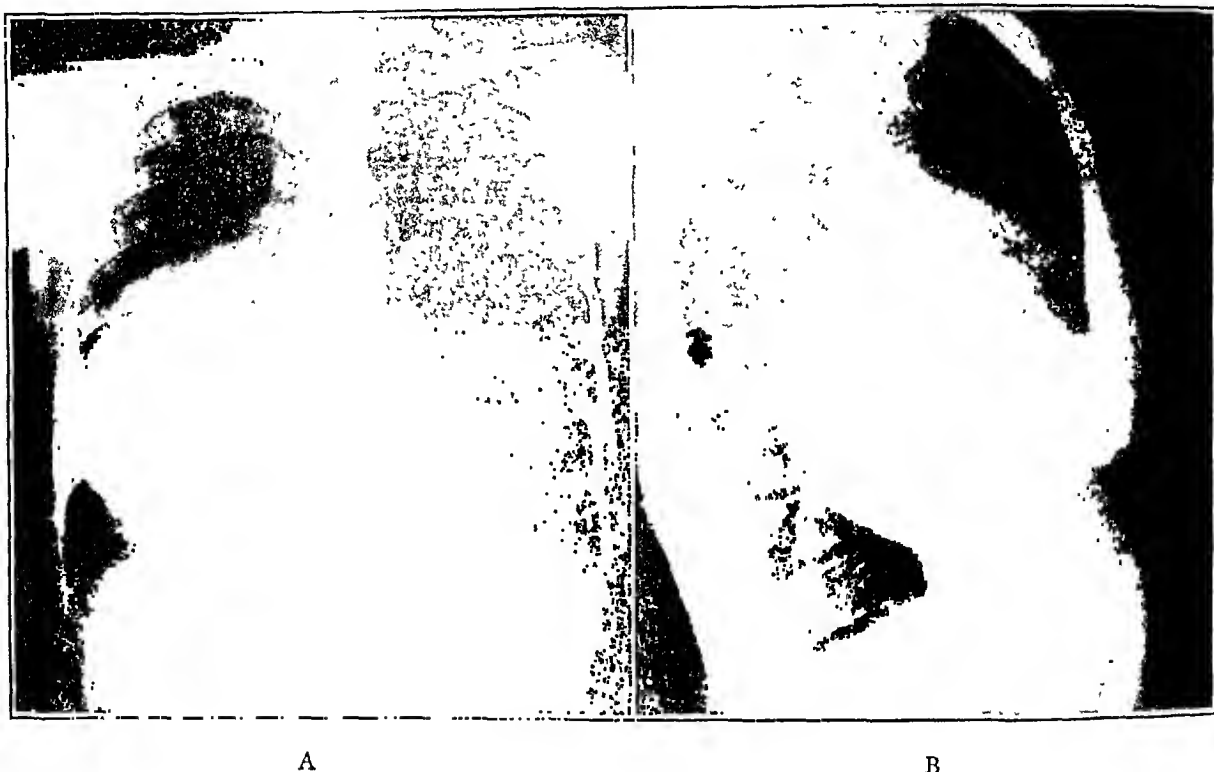


FIGURE 1. *Photographs of X-Ray Films Showing the Ovoid Mass in the Chest.*
A = anteroposterior view; B = lateral view.

was increased. No rales were heard. The remainder of the examination was negative.

The temperature, pulse and respirations were normal.

Examination of the urine was negative. The blood showed a red-cell count of 4,900,000 with a hemoglobin of 75 per cent, and a white-cell count of 6600 with 74 per cent polymorphonuclears. A blood Hinton test was negative.

X-ray films of the chest showed a large ovoid mass adjacent to the right border of the heart and filling the greater portion of the right lower-lung and midlung fields (Fig. 1). In the lateral view the mass filled the anterior two thirds of the chest. The lower border of the mass touched the diaphragm, and its upper border extended above the level of the hilus. Its center lay slightly anterior

to the trachea in the lateral view. There were several plaques of calcification within its periphery. The heart was not displaced, and the mass could not be separated from the right cardiac border. Slight transmitted pulsation was evident. The right border of the heart was visible neither during fluoroscopy nor on the film. The superior mediastinum was distinctly widened, and its border was concave laterally. The remainder of the chest was not remarkable.

DIFFERENTIAL DIAGNOSIS

DR. RALPH ADAMS: Chronic pain in the shoulder in association with symptoms of visceral disease may itself be considered visceral in origin when local explanations are lacking. Visceral causes may be grouped as those that irritate the diaphragm or its serous coverings, either peritoneal and pleural, those involving the upper intercostal nerves, and those directly affecting the phrenic nerve.

A sense of oppression on lying down is common in diseases characterized by abnormal return flow of blood to the heart, such as right-sided failure with pulmonary congestion and constrictive peri-

carditis with increased venous pressure. Cerebral anoxemia from venous stasis is a common factor in these conditions, and the patient learns to stay comfortable by avoiding the horizontal position. A sense of oppression arising unilaterally, however, suggests a localized partial obstruction to blood flow and demands a more specific explanation.

The loss of 25 pounds in weight within a year is indicative of altered metabolism. Either the patient had stopped eating or there had appeared some catabolic factor such as cancer, tuberculous infection or thyrotoxicosis to account for the weight loss. Any one of the three might bring about a productive morning cough, the first by invasion of the bronchial mucosa or pressure on a bronchus, the second by parenchymal lung destruction and the third by pressure on the trachea or a main bronchus, if the goiter lay subinternally.

A heavy sensation in one side of the chest, if persistent, is only rarely imaginary, although adequate explanation frequently eludes careful investigation, and the passage of time may be required for the development of localizing signs. In this case the heaviness in the chest appeared late and was apparently due to an expanding lesion. Pleural effusion, tumors causing bronchial constriction and pneumothorax may produce the symptom of heaviness, and probably have been named in the order of frequency, although statistical proof is not at hand.

The physical examination was unquestionably colored by the report from the outside hospital of a tumor in the right chest and the presence of thick yellowish intrapleural fluid. Distention of the neck veins means increased pressure within the superior vena cava. A normal heart by examination, so far as data are given for interpretation, excludes pericardial and cardiac disease and leaves one free to follow the assumption that the superior caval compression was due to the tumor mass. Signs of dullness over areas normally occupied by aerated tissue indicate replacement of the latter by tissue of greater density and less air content than the normal lung. These are signs that might be found over lung infiltrated by tumor and devoid of air, over a mediastinal tumor displacing and compressing the lung or over an encapsulated empyema. The absence of rales is not conclusive, but strongly suggests that the lung is not intrinsically diseased. Intrapulmonary disease sufficient to produce the other signs recorded could scarcely exist without producing rales.

The x-ray films described afford additional valuable evidence, and support the impression obtained from the history and the physical examination that the lesion is outside the lung and in

the mediastinum—in fact, in the anterior mediastinum.

Its position is medial to that which an empyema could occupy without rupture into the mediastinum, and the absence of evidence of infection further excludes that unlikely possibility.

To recapitulate, a typical history is given of a slowly growing anterior mediastinal tumor, producing a progressive sequence of symptoms—namely, displacement of the phrenic nerve posteriorly, with symptoms referred to the shoulder, interference with venous return from above the heart, presumably from pressure, a sense of oppression when the pressure was aggravated by lying on the affected side, distention of the neck veins and a mild productive cough by pressure irritation of the lower trachea.

There remain only three diagnostic possibilities. One is substernal goiter. The low position in the chest does not exclude it, and there is at least one surgical specimen in the hospital material of a large goiter removed from its resting place on the diaphragm. The weight loss is consistent with goiter, but there is no history of hyperthyroidism and the pulse is normal. A nontoxic or colloid goiter of this size in the mediastinum without detectable signs in the neck or elevated basal metabolic rate is possible. The calcification noted could occur in thyroid tissue, but an exudate of thick yellowish fluid ought not to be present.

Another possible diagnosis is neurofibroma, a notorious stimulator of diagnostic guessing bees, but it rarely occurs in the anterior mediastinum, being usually found in the posterior region, lying in the costovertebral gutter, arising from intercostal or sympathetic nerves and sometimes eroding contiguous ribs by pressure.

Malignant tumors are not among the probabilities in this case because of the duration of symptoms, the relative health of the patient and the calcification within the slowly growing tumor walls. Teratoma is also excluded.

The final and only tenable diagnosis is dermoid cyst of the anterior mediastinum. In the absence of signs of effusion in the x-ray film, it seems likely that the thoracentesis was in effect a puncture of the cyst and that the turbid fluid obtained represented cyst contents. I should like to have had the opportunity to examine this fluid for the presence of cholesterol crystals and epithelial debris; if present, they would have confirmed my diagnosis.

CLINICAL DIAGNOSIS

Dermoid cyst of anterior mediastinum.

DR. ADAMS'S DIAGNOSIS

Dermoid cyst of anterior mediastinum.

ANATOMIC DIAGNOSIS

Dermoid cyst of anterior mediastinum.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: The X-ray Department was reluctant to make a diagnosis of a dermoid cyst in this case because of the presence of calcification. We have, however, seen calcification in dermoids on other occasions. Dr. Adams's diagnosis was readily substantiated when the patient was operated on by Dr. Edward D. Churchill. The right pleural cavity was opened following subperiosteal resection of the fourth right rib. A large avascular cystic tumor was found in the anterior mediastinum projecting into and largely filling the right pleural cavity, displacing the middle and lower lobes backward and laterally. The

upper lobe was partially adherent. A plane of cleavage was found that permitted fairly easy enucleation except at the point of origin, which was just below the point of bifurcation of the trachea and about the superior vena cava.

The specimen that reached the laboratory was an unruptured cyst 20 cm. in circumference, with a wall varying from 2 to 4 mm. in thickness, which contained numerous thin calcified plaques 2 to 6 mm. in diameter. The cavity contained matted hair, and on microscopic examination the walls showed the characteristic skinlike structure of a dermoid.

The patient made a rapid postoperative recovery from the physical point of view, although the development of a postoperative psychosis somewhat delayed her discharge from the hospital.

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of
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SUBSCRIPTION TERMS: \$6.00 per year in advance, postage paid, for the United States; Canada, \$7.04 per year; \$8.52 per year for all foreign countries belonging to the Postal Union.

MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

COMMUNITY FUND

LAST week physicians were reminded that a challenge had been issued, since their quota for the Community Fund had been increased to \$20,500.

How is it going? At the end of the first week of the drive, January 24, a total of seventy-three doctors had given \$7000, which is an average of nearly \$100 per person. Twenty-four of this number made increases in their gifts over last year. These men are the leaders, and they also give generously of their time in many of the social agencies that the fund helps to support.

An interesting anecdote is worth recording here. One of these men said: "Well, here is the yearly collection of pledges for the fund. You know, I think we should look on this organization as a voluntary tax program in which we give to a

selected group whom we trust, to manage our community welfare." This expression contains the very essence of the objective in contributing to the Community Fund.

The community is looking for the financial support of the medical profession, and only five days remain.

SOCIAL HYGIENE DAY

THE designation of February 5 as Social Hygiene Day is particularly significant this year, since large numbers of young men will be gathered together in cantonments and in the areas where war industries are located. It is a well-recognized fact that when young men are collected in camps or in industrial centers, syphilis and gonorrhea constitute a major hazard. During World War I a total of 7,004,818 days, equivalent to a year's actual absence from service of 22,300 men, was lost by the United States Army and Navy as the result of genitoinfectious diseases.

Although the Government plans to protect the health of its soldiers and sailors so far as possible, it cannot regulate their behavior when off duty. The health of workers in the war industries is even less controlled, and that of the civil population, so far as it is affected by contact with service men and workers, is regulated only when the identity of an infected person is made known to the local board of health.

During this critical period, the American Social Hygiene Association and its constituent state societies can be of the greatest help. A four-point program has been outlined, consisting of the following activities:

Through educational activities, such as films, literature, exhibits and lectures, to help soldiers, sailors, industrial workers and the population in general to understand the hazards of syphilis and gonorrhea.

To encourage the passage and enforcement of protective laws for the reduction of prostitution and the prevention of delinquency, especially in areas of concentration of armed forces and of defense-industry workers.

To promote and aid in the establishment of facilities for early disinfection and other preventive measures.

To urge provision of adequate diagnosis, treatment and isolation, particularly where local facilities are inadequate to cope with the situation.

This program is an amplification of the work that has been carried on for some years by the Massachusetts Society for Social Hygiene and its adaptation to the particular needs arising from the concentration of young men in camps and industrial centers.

The situation is one that deeply affects the whole nation; it calls for co-ordinated action by all those organizations that are concerned with the public welfare. It is imperative that the members of the medical profession should be prepared to inform the public of the deleterious effect of genitoinfectious diseases on the efficiency of the nation's forces, and to spread the doctrine that control of these diseases is an important way to strengthen national defense.

MEDICAL EPONYM

GAUCHER'S DISEASE

"L'épithélioma primitif de la rate, hypertrophie idiopathique de la rate sans leucémie [Primary epithelioma of the spleen, idiopathic hypertrophy of the spleen without leukemia]" was the title of Philippe Charles Ernest Gaucher's (1854-1918) thesis for the degree of doctor of medicine from the University of Paris in 1882. The following translation is the résumé of his conclusions:

There is a peculiar kind of primary and idiopathic hypertrophy of the spleen to which I propose to give the name "*primary epithelioma of the spleen*" in accordance with its histologic characteristics.

The *clinical features* of this disease are: gradual, progressive enlargement of the spleen to a considerable degree, with associated spontaneous pains and various compression phenomena, hemorrhage (epistaxis, purpura and hemorrhagic gingivitis), occasionally jaundice resultant on secondary enlargement of the liver, without leukemia, intermittent fever or ascites, and terminating in a marked cachexia.

The *anatomic feature* is a very large spleen (4770 gm.) of uniform and even development, its surface smooth and regular, the color and form almost normal, but hard and sclerotic.

The *histologic characteristics* are: complete replacement of the normal splenic elements by large, epithelial cells, irregularly rounded or polyhedral in shape, nucleated, and enclosed in the normal interstices of the hyperplastic splenic reticulum; interstitial hemorrhages; complete disappearance of the Malpighian corpuscles; partial disappearance of the blood vessels.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

CONGESTIVE FAILURE DUE TO MITRAL STENOSIS AND TREATED BY THERAPEUTIC ABORTION

Mrs. R. E., a thirty-nine-year-old para IV, was admitted to the hospital on June 21, 1940, complaining of shortness of breath and epigastric fullness. She was in the sixth month of her pregnancy.

The family history was noncontributory. The patient's past history included measles and typhoid fever, for which she was kept in bed five or six weeks. There was no history of rheumatic fever or chorea. The first two pregnancies went to full term with normal deliveries. The third pregnancy, in 1936, was complicated by decompensation in the third month. After consultation, a therapeutic abortion was performed, following which the patient made a complete recovery. Catamenia began at the age of twelve, were regular with a thirty-day cycle and lasted five days without pain. The last period began on December 20, 1939, making the expected date of confinement, September 27.

The patient had been feeling fairly well since the onset of this pregnancy except for swelling of the feet and ankles and some breathlessness on exertion during the month preceding entry. On June 17, she began to have considerable dyspnea, coughing and a painful sensation across the lower chest and epigastrium. She was admitted to the hospital four days later.

In view of the cardiac condition, a medical consultation was held. The consultant's note reads as follows:

The patient has had well-compensated valvular heart disease, but congestive failure has now developed. Physical examination shows tachycardia and slightly accentuated heart sounds, with definite diastolic and presystolic murmurs at the apex and a slight early diastolic murmur at the left sternal border; there are rales at bases of the lungs and definite pitting edema over the sacrum and ankles. The blood pressure is 180 systolic, 85 diastolic. Diagnoses: mitral stenosis, hypertension and congestive failure. Immediate digitalization is advised, and if after a few days, the patient shows some improvement, a therapeutic abortion should be performed.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

On July 1, under cyclopropane anesthesia, a therapeutic abortion was completed by means of abdominal hysterotomy. A living premature baby was delivered, who died forty hours later. Both tubes were ligated at the time of operation. Convalescence was essentially afebrile, and the patient was discharged on the thirteenth postoperative day.

The patient's general condition at discharge was good. There was no edema; the blood pressure was 118 systolic, 74 diastolic, the pulse 88. There was no dyspnea or signs of cardiac embarrassment.

Comment. The question arises whether the present pregnancy should have been terminated, like the previous one, by early therapeutic abortion. That this would have been the wiser procedure is shown by the decompensation that subsequently developed. However, the advisability of interrupting pregnancy in a cardiac patient who has been allowed to go on to such a late stage is questionable. Some authorities advise hospitalization and carrying the patient to term. However, in spite of rules and in spite of statistics, each case should be decided on its own merits. The result in this case reasonably justified the treatment.

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning February 2:

MIDDLESEX EAST

Tuesday, February 4, at 4:15 p.m., at the Melrose Hospital, Melrose. Diagnosis and Treatment of Minor Lesions of Rectum and Anus. Instructor: Neil W. Swinton. Walter H. Flanders, *Chairman*.

MIDDLESEX SOUTH

Tuesday, February 4, at 4:00 p.m., at the Cambridge Hospital, Mt. Auburn Street, Cambridge. Obstetric Complications: With case histories and clinical problems. Instructor: M. V. Kappius. Dudley Merrill, *Chairman*.

NORFOLK

Thursday, February 6, at 8:30 p.m., at the Norwood Hospital, Norwood. Acute Abdominal Pain: Its interpretation and management. Instructor: Richard B. Cattell. Hugo B. C. Rierner, *Chairman*.

NORFOLK SOUTH

Monday, February 3, at 8:30 p.m., at the Quincy City Hospital, Quincy. Dermatitis and Eczema. Instructor: Jacob H. Swartz. David L. Belding, *Chairman*.

SUFFOLK

Thursday, February 6, at 4:30 p.m., in John Ware Hall, Boston Medical Library. Dermatitis and Eczema. Instructor: John G. Downing. Reginald Fitz, *Chairman*.

DEATHS

CROFTS — NICHOLAS M. CROFTS, M.D., of North Adams, died September 17, 1940. He was in his seventy-sixth year.

Born at Carlton Place, Canada, he received his degree from the Baltimore Medical College in 1898, and in 1914 took a postgraduate course at the University of Maryland.

Dr. Crofts was a fellow of the Massachusetts Medical Society and of the American Medical Association.

A daughter and one brother survive him.

MAGEE — EDWARD J. MAGEE, M.D., of Danvers, died January 20. He was in his seventy-ninth year.

Born in Oswego, New York, he attended Ottawa College and Villanova College and received his degree from the College of Physicians and Surgeons of Boston in 1891.

Dr. Magee was a member of the Massachusetts Medical Society and the American Medical Association, and was on the staff of the Hunt Memorial Hospital in Danvers.

A daughter survives him.

MISCELLANY

RÉSUMÉ OF COMMUNICABLE DISEASES IN MASSACHUSETTS FOR DECEMBER, 1940

DISEASES	DECEMBER 1940	DECEMBER 1939	FIVE YEAR AVERAGE*
Anterior poliomyelitis	0	6	6
Chicken pox	1679	1511	1442
Diphtheria	9	20	26
Dog bite	539	578	539
Dysentery, bacillary	3	27	12
German measles	48	26	62
Gonorrhea	294	335	470
Lobar pneumonia	406	396	469
Measles	1166	1082	964
Meningococcus meningitis	7	1	6
Mumps	597	347	603
Paratyphoid B fever	1	2	3
Scarlet fever	642	412	722
Syphilis	376	433	454
Tuberculosis, pulmonary	326	284	259
Tuberculosis, other forms	30	28	28
Typhoid fever	6	5	7
Undulant fever	5	2	5
Whooping cough	1160	498	807

*Based on figures for preceding five years

RARE DISEASES

Anthrax was reported from: Haverhill, 1; Peabody, 1; total, 2.

Diphtheria was reported from: Boston, 1; Chelsea, 1; Fall River, 5; Reading, 1; Waltham, 1; total, 9.

Dysentery, bacillary, was reported from: Boston, 2; Watertown, 1; total, 3.

Meningococcus meningitis was reported from: Beverly, 1; Boston, 1; Milford, 1; Orange, 1; Swampscott, 1; Worcester, 2; total, 7.

Paratyphoid B fever was reported from: Springfield, 1; total, 1.

Pfeiffer bacillus meningitis was reported from: Orange, 1; Spencer, 1; total, 2.

Septic sore throat was reported from: Boston, 5; Malden, 2; Medford, 1; Melrose, 1; Merrimac, 1; Montague, 1; New Bedford, 1; Quincy, 1; Taunton, 2; Wrentham, 2; total, 17.

Trachoma was reported from: Boston, 1; New Bedford, 1; total, 2.

Trichinosis was reported from: Boston, 1; total, 1.

Typhoid fever was reported from: Boston, 1; Lawrence, 1; Lexington, 1; New Bedford, 1; Quincy, 1; Waltham, 1; total, 6.

Undulant fever was reported from: Acton, 1; Amherst, 1; Chelmsford, 1; Lynnfield, 1; Petersham, 1; total, 5.

Chicken pox, measles and pulmonary tuberculosis were reported above the five-year averages.

Diphtheria, typhoid fever, paratyphoid fever, anterior poliomyelitis, bacillary dysentery, German measles, lobar pneumonia and scarlet fever were reported below the five-year averages.

The incidences of meningococcus meningitis, mumps, tuberculosis (other forms) and undulant fever were not remarkable.

Whooping cough showed unusually high incidence.

Dog bite was reported at a record high figure for the fifth consecutive month. Animal rabies was reported from Leicester, Spencer and Worcester, which are adjacent to one another.

TUBERCULOSIS EXHIBIT

Last year the National Tuberculosis Association built for the annual meeting of the American Medical Association an illuminated exhibit on "Morphologic Biology of Tuberculosis." A new and better exhibit is being built for the Cleveland meeting. It may be borrowed by any medical society whose meeting is to be held later than June 10, 1941. Those who are interested should communicate with the Massachusetts Tuberculosis League, Little Building, Boston.

MAINE NEWS

PANEL DISCUSSIONS AVAILABLE TO COUNTY MEDICAL SOCIETIES

The following panel discussions have been made available for presentation before county medical societies by the Committee on Graduate Education:

Coronary Disease. E. H. Drake, M.D., Portland, chairman.

Complications of Pregnancy. R. B. Moore, M.D., Portland, chairman.

Disease of the Liver and Bile Passages. J. Gottlieb, M.D., Lewiston, chairman.

Endocrine Dysfunction. James Carswell, M.D., Camden, chairman.

Syphilis. O. R. Johnson, M.D., Portland, chairman.

Chemotherapy. F. T. Hill, M.D., Waterville, chairman.

Appendicitis. I. M. Webber, M.D., Portland, chairman.

NEW MEMBERS

The following physicians have recently been admitted to membership in the Maine Medical Association:

James M. Parker, Portland.

Henry B. Finks, Portland.

Dexter J. Clough, 2nd, Bangor.

Hans Schurman, Dexter.

John E. Smith, Bangor.

MOTOR-VEHICLE DEATHS FOR 1940

Motor-vehicle deaths in one hundred and fifty-eight major cities increased 3.4 per cent in 1940 over the previous year, according to reports made public recently by Director William L. Austin, Bureau of the Census, Department of Commerce. Deaths for 1940 totaled 8441, compared with 8162 in 1939. These percentage increases are based on provisional figures for 1940 and 1939.

Considering only those deaths in each city due to motor-vehicle accidents occurring within the city limits, the 1940 reports showed a total of 5799 deaths. This figure is an increase of 68 deaths, or 1.2 per cent, over the 5371 deaths reported for the same cities in 1939. The increase in the total is reflected in the individual cities, seventy-six of which showed an increase in the number of deaths over 1939; seventy-one showed a decrease, and eleven cities had the same number.

Eight of the cities having populations of 500,000 or more and showing increases in the number of deaths occurring within the city are: New York City (1.0 per cent); Detroit (13.5 per cent); Los Angeles (12.0 per cent); Baltimore (2.4 per cent); St. Louis (91.5 per cent); Boston (7.1 per cent); Pittsburgh (11.6 per cent); and Milwaukee (25.0 per cent). Five cities having similar populations and showing decreases from the 1939 figures are: Chicago (4.4 per cent); Cincinnati (13.0 per cent); Washington (24.4 per cent); San Francisco (13.2 per cent); and Buffalo (22.9 per cent).

CORRESPONDENCE

PHYSICIAN WANTED AT ST. GEORGE, MAINE

To the Editor: The town of St. George is without a physician. Do you know some good physician who would be interested in locating here? The nearest physician we can call lives in Thomaston or Rockland, fifteen or twenty miles away.

M. J. HARRIS.

Tenants Harbor, Maine.

ENGLAND IN THE FALL OF 1940

To the Editor: I believe the following letter from Sir James Purves-Stewart will be of interest to the readers of the *Journal*. It is written from his lighthouse home on the south coast of Sussex, a most exposed position.

HENRY R. VIETS, M.D.

* * *

Belle Tout Lighthouse,
Beachy Head, Sussex,
November 4, 1940.

Dear Dr. Viets:

Your very kind letter of August 31 took many weeks to arrive, but ultimately reached me here a couple of weeks ago. I waited until today, when the reprint of your kindly review of "Sands of Time" arrived, before replying to it. I am glad that the book made a favorable impression on you.

We in England are at the most historic phase of our history. During the last six months, we have had to confront one catastrophe after another. In May the allied forces, which had occupied Narvik in Norway, were withdrawn, to face-up Hitler's sudden "protection" of Denmark and his unprovoked attack on Holland and Belgium. Then the Germans out-flanked the Maginot line, on which the faith of the French had been blindly fixed.

and proceeded to sweep into Belgium from the south as well as the west. Holland threw up the sponge, after four days. Then in Flanders, after a courageous allied Franco-Anglo-Belgian start, Leopold of the Belgians suddenly surrendered, without notifying his allies, thereby laying the left flank of the allied army wide open to the enemy. The Germans naturally thought they had us at their mercy, surrounded on three sides. But the English, and part of the French army, fought their way back to the coast at Dunkirk, where nine tenths of their army of 350,000 men were successfully evacuated by the British fleet, assisted by every available smack, fishing boat and pleasure-boat on the east coast of England. All this was under a withering hail of artillery and tank guns, like wise air plane bombs, from the enemy. The English troops made a stubborn resistance. Our air planes drove off the Germans with comparative ease, whenever they got in touch, our infantry cut through the German battalions like straw, being better than them, man for man, every time. Our troops hated re-embarking, but the strategic position was hopeless and we were outnumbered six or seven times over. Anyhow the withdrawal, skilful though it was, was a major setback for us, and one which we are grimly determined to avenge, when the time comes.

Then, worst of all, France, betrayed by her corrupt government, threw up the sponge, and left Great Britain to carry on alone. Ever since, the puny politicians at Vichy have been grovelling to the German high command. Petain has become a confirmed boot-licker of his conqueror. His speeches, to his own countrymen, have been ignoble in their servility, entirely unlike what one would have expected from the hero of Verdun in 1917.

England is now the only European power that stands between Hitler and world domination. We are determined to fight, to the last man, the last cartridge, and the last ration. But since we have been alone, the tide has begun to turn. Every month we feel more optimistic. One side or the other must be crushed, and crushed permanently. It won't be England. We are full of enthusiasm and keenness. Hitler's threat of invasion, and the partial attempt which he started to make in September, has not materialised. We hoped it would. Every man here was and still is, on tip-toe, eager to get at the enemy and to ensure that not one of the invaders will ever see his Vaterland again.

I myself joined up with the Home Guard, doing rifle practice, bombing tactics, etc., and wearing khaki uniform (for the third time in my lifetime). Of course I was over age, but I managed to have a failure of memory when stating my age, and was not only accepted but placed in charge of the medical arrangements for casualties in our local battalion. Since then after three months service, under false pretences, I have been combed out. Had I been placed in the dock as a criminal, I should have pleaded guilty, and thrown myself on the mercy of the court.

Recently I have been appointed as liaison officer with the Foreign Relations Department of the British Red Cross, and last week completed a tour of inspection of prisoners of war camps in England. Most of these prisoners are young airmen. It is interesting to observe their mentality. They are officers, but not officers and gentlemen. They are more like the gangster type. And they have abnormal tastes, at times. The amount of face cream bought by German airmen officers is curiously large. If lip-stick were available, they would buy that, too. Several have been brought down with painted lips

and cheeks. This German type of vice is interesting to the medical psychologist.

By this time our airmen have clearly demonstrated their superiority over the Germans. The enemy losses in air fights are three or four to one of ours. So we have command of the air over England, although the Germans send over air planes at night, to destroy London, Liverpool, Eastbourne, Dover and other towns. They claim that they only attack military targets. These include St Paul's cathedral, St James's, and Buckingham and Kensington palaces, the mediaeval Elizabethan Temple of the law courts, and innumerable hospitals and rows of private houses. The German embassy in London, by accident, has been destroyed by their own bombs. But every man, woman and child is a military target to the German airman. We recognise this, and don't grumble unnecessarily.

Meanwhile our navy commands the seven seas. And when our growing supply of air planes, from Canada and the U S A, attains anything like equality in numbers with the enemy, we shall then disinfect the skies of Europe from the Nazi stench.

Don't be sorry for us. As Shakespeare says in *Henry V*

If we are mark'd to die, we are now
To do our country loss, and if to live,
The fewer men, the greater share of honour.

Here in our little lighthouse, on the Sussex cliff edge, we are daily witnesses of bombings and aerial dog fights. So far, our lighthouse has not been hit, although many bombs have fallen close by. We have sandbagged our roof against incendiary bombs. The main tower, of granite, six feet thick, will probably stand up to a direct hit, even from a heavy shell. But we are determined to stay put. If we are to be bombed, we shall be bombed comfortably in our own home, rather than wandering over the country, seeking for some unattainable safe place.

If only your polyethnic U S A would come in, too, it would hasten the victory—even if not a single American soldier embarked for Europe.

With kind regards to yourself and all my American friends and colleagues

Very cordially yours,

J PURVES-STEWART

The German radio informs us that we are already completely beaten, and it is only our congenital stupidity which prevents us from realising it.

MASSACHUSETTS STATE GUARD

A number of doctors are needed for duty as medical officers with the new Massachusetts State Guard which is now being formed. This volunteer organization will function in place of the Massachusetts National Guard, which is being inducted into federal service. It will be trained to cope with any emergency situation that might occur within the Commonwealth and which might overtax the capacities of civilian organizations.

A doctor, after receiving his commission, at the outset will have to devote a certain number of evenings to the examination of recruits, and thereafter will be expected to give one evening a week to drill, training and other routine duties. Full time service will be required only in the event of some emergency, and will be limited to within the State.

The requirements of the physical examination are not strict. Previous military experience is desirable but not a necessary prerequisite. It is not expected that this duty

will interfere materially with one's private practice. Any interested medical men will please communicate promptly with the undersigned, stating briefly their age, qualifications, and previous military experience, if any. Outside the Greater Boston area, there is need for one or more men in or near Brockton, Fall River, Framingham, Holyoke, Lawrence, Lynn, New Bedford, Pittsfield, Plymouth, Salem, Springfield and Worcester.

RICHARD H. MILLER, M.D., *Chief Surgeon.*

264 Beacon Street,
Boston.

REPORT OF MEETING

NEW ENGLAND PEDIATRIC SOCIETY

A regular meeting of the New England Pediatric Society was held at the Longwood Towers on October 30, 1940, with Dr. R. Cannon Eley presiding. Dr. Philip M. Stimson, of the Willard Parker Hospital in New York City, spoke on "Certain Aspects of the Common Contagious Diseases." Only the more important practical and controversial problems concerned with measles, mumps, chicken pox, rubella, scarlet fever, diphtheria, pertussis and poliomyelitis were discussed.

With regard to prevention, Dr. Stimson stated that active vaccination is definitely indicated for diphtheria and strongly advised for pertussis, particularly in infancy. An analysis of statistics from Cleveland, where 10 per cent of the children received Sauer vaccine, and neighboring Shaker Heights, where 75 per cent were vaccinated, revealed that the incidence of pertussis declined 11 per cent in the former and 83 per cent in the latter community, as compared with the prevaccination era. And there also seems to be evidence that the severity of the disease is diminished, even if total protection is not afforded. The total dose may now be as high as 100,000,000,000 organisms, and the question of a "refresher" vaccination each year during childhood is being considered.

Dr. Stimson considers scarlet fever vaccination to be effectual but not necessary or feasible except in asylums, in families in which scarlet fever has appeared, and in the medical and nursing professions.

An interesting situation has now arisen as the result of the widespread adoption of diphtheria vaccination; young adults are less exposed to the disappearing disease, and there is an increase in the percentage of susceptibles as shown by statistics. It was advised, therefore, that non-immune young adults receive two doses of alum-precipitated toxoid, with an interval of one month between injections. The Schick relapse rate, interestingly enough, has been found to be three times as high in those with the disease as in the vaccinated group.

Passive immunization is accepted for scarlet fever and diphtheria, whereas the use of convalescent serum in whooping cough is believed to confer at least a partial immunity for two or three weeks. This method of attack is particularly recommended for very young infants, who would fail to respond to active immunization.

So far as the virus infections are concerned, Dr. Stimson said that chemotherapy has so far proved inefficacious; that passive immunity with serum may be conferred when there is a generalized circulation of the causative agent, as in measles and mumps; that this form of prophylaxis is of no avail once the virus has become intracellular; that active immunity with dead or inactivated virus is ineffective; and that the immunity resulting from contracting the disease is lasting and of humoral and cellular form—except in herpes and influenza.

Further prophylactic possibilities are now being developed by the Dicks, who are working on a pill form of toxin for scarlet fever, and by experiments concerning the effect of chorioallantoic extracts on the virus of measles.

Diagnostic problems were next discussed. It has been found that measles usually occurs in biennial epidemics. Measles is not spread by its complications, so that a patient may be considered safe five days after the rash. The blood of measles patients is contagious, at least during the latter half of the incubation period, but Dr. Stimson stated that this does not mitigate against the pooling of such blood with others for "bank" purposes.

Rubella is rare except in epidemics and should be diagnosed with caution. Roseola infantum also is of importance in the differential diagnosis of measles. It occurs at two to three years of age and is ushered in by three days of unexplained fever with a morbilliform rash appearing after the fever has fallen and then starting on the body and being unaccompanied by Koplik's spots or coryza.

Chicken pox has been found to break out in epidemic form about two weeks following herpes zoster.

Diphtheria should probably be diagnosed clinically in most cases and should be corroborated by cultures. The use of a 2 per cent aqueous solution of potassium tellurite, which causes a blackening of the membrane, has been shown to result in too many false positive reactions to make it reliable, although a negative test rules out diphtheria fairly well. Clinically in diphtheria there is no erosion or ulceration but only a piling up of tissue. In the presence of ulceration, syphilis should be suspected if pain is absent; Vincent's angina, if the lesion is painful; and agranulocytic leukopenia, if prostration is marked. The electrocardiogram is useful in the diagnosis of late cardiac involvement. In mild cases there may be only an inverted T wave, but this should suffice to keep the patient in bed as long as two months. Eventual complete recovery is the rule unless death ensues.

Mumps occurred in one twentieth of the white and one sixth of the colored soldiers in the United States Army during World War I and was the third most important disease for loss of time. The virus probably enters by way of the nasopharynx into the bloodstream and then lodges in the glandular system, particularly the parotid glands. Meningitis and orchitis may occur at any stage, with or without parotitis. The height of the fever depends on the pressure to which the inflamed tissues are subjected. Sterility has been found a rare sequela because of the infrequent bilateral or complete involvement of the testes. Early incision of the testis was advised to lower the temperature, relieve the pain and prevent the danger of sterility.

In regard to treatment of these diseases, Dr. Stimson warned of the need for careful evaluation of statistics and clinical impressions, for the causative agent may vary in virulence and the course may be variable. The mortality from whooping cough at the Willard Parker Hospital, for example, decreased from 8 to 2 per cent on the same regimen. The importance of preventing cross and secondary infections was stressed, and the suggestion was made for less crowding in children's wards and better nursing technic. Isolation is usually based on the premise that there are no airborne epidemics and that a cough carries only five feet. Yet streptococci have been shown to exist in viable form in dust for twenty-four hours, and it is possible that several other organisms may do likewise. The use of ultraviolet light for air sterilization has been found to give encouraging results. The inoculation of all admissions to children's wards with convalescent or

adult serum or with placental extract has been suggested

The prevention of the spread of chicken pox remains an enigma. For treatment daily baths without rubbing were advised, and the immediate removal of all plaster casts and adhesive tape was strongly urged.

Scarlet fever is of variable severity, as shown by statistics from different countries and localities. Human convalescent serum in doses of 40 to 100 cc within twenty-four hours has been found beneficial, whereas modified horse serum, which gives reactions in less than 10 per cent of cases, has been shown to be equally effective and cheaper. Its use has been particularly advised for severe, toxic cases. Sulfanilamide, if administered early, may diminish the complications, for it guards against the streptococci of cross infections if not against those of scarlatina itself.

Convalescent serum decreases the number of cases and severity of measles if given more than twenty-four hours before the eruption. This is the only instance of effective serum therapy against a virus. The complicating pneumonias usually respond to chemotherapy, since they are streptococcal or mixed in etiology. Those of virus origin do not respond.

The pneumonia of pertussis should be treated as dictated by the culture, but the results with chemotherapy are not so good as in measles. To decrease the cerebral anoxia of the spasms and the resulting convulsions, oxygen has been found beneficial. The use of Kreuger vaccine for ten to fourteen days is expensive and hard on the patient in view of its questionable value in decreasing the severity of individual spasms.

In treating diphtheria, not less than 10,000 units of antitoxin are administered immediately intramuscularly; the use of more than 25,000 units intramuscularly and the same amount intravenously is rarely necessary. In toxic patients 5 to 10 per cent glucose is given intravenously to combat the decrease of liver glycogen. Laryngeal diphtheria is treated by aspiration rather than intubation. Serum reactions are being encountered in fewer cases. Histaminase is still unproved as an antidote, but Dr. Stimson stated that only very rarely is one unable to administer antitoxin following proper precautions. The use of a loose tourniquet and ephedrine was suggested, for patients thought to be serum sensitive, the injections being made in the anterior thigh, otherwise deep in the buttock.

More streptococcal throats are now being seen, and the early use of tracheotomy in cases of laryngeal obstruction instead of the former nonoperative regimen has resulted in the saving of 70 per cent of serious cases.

Investigations in poliomyelitis have accomplished little. A considerable incidence of the virus has been found in the stools, even of normal persons, a fact which presents the problem of whether the alimentary rather than respiratory tract is not the mode of entrance. The possibility that epidemics are started by food, water and other human hosts is becoming more real. The best protection at present, therefore, probably lies in proper personal hygiene, the prevention of fatigue, pasteurization of all milk, the boiling of water, and the barring of public swimming and the performance of tonsillectomies during an outbreak. Treatment should consist in complete rest in any illness during an epidemic. A patient should not be moved even to a hospital, unless a respirator is necessary. After diagnosis no muscles should be allowed to be stretched and no serum need be given. Ten per cent glucose may aid toxic patients, and massive doses of thymine chloride are possibly worth trying.

The discussion was opened by Dr. Conrad Wesselhoeft, who suggested the mixing of urban and rural recruits in

training camps to decrease the incidence of measles and mumps, and the use of convalescent serum for nonimmune contacts. The orchitis of mumps rarely occurs before puberty. Early incision is reserved for severe cases to relieve pain, to lower the fever and to save the testis from pressure atrophy. Ovaritis may occur before puberty and is usually accompanied by a vaginal discharge, moderate pain and an elevated temperature. In adults the temperature may reach 106°F and may be accompanied by chills. Atrophy is lacking because of the absence of a confining capsule.

Dr. Edwin H. Place of the Boston City Hospital, defended scarlet fever immunization. He stated that it does prevent the disease if properly used and that the main question concerns the prevention of toxic manifestations when the bacteria are uninfected. The complications of the latter can be minimized by adequate chemotherapy. Dr. Place decried the illogical practice of immunizing the medical profession and children in asylums and then allowing those on the fringe to go unprotected. He stated that the danger of immunization is highly overrated and that it must be classed merely as an unpleasant procedure.

Dr. Place warned against smallpox vaccination in dermatitis except in emergencies, because of the danger of eczema vaccinatum. Although dressings are inadvisable over vaccinations according to public health authorities, Dr. Place stated that proper light dressings prevent spread of the vaccine and the development of secondary infection.

Dr. Stimson closed the discussion with the observation that nurses may need as many as ten injections of toxin to get a permanently negative Dick test. He warned against diagnosing rubella except in epidemics and urged the discarding of the confusing name of German measles. In regard to the development of severe diphtheria in posttonsillectomy cases, —a rare danger,—he urged that the surgeon know the patient's state of immunity to diphtheria to be sure that he is not operating on a susceptible carrier.

NOTICES

ANNOUNCEMENT

CLIFFORD C. FRANSEEN, M.D., announces the removal of his office from 195 Pilgrim Road, Boston, to 1101 Beacon Street, Brookline.

NEW ENGLAND SOCIETY OF ANESTHESIOLOGY

The February meeting of the New England Society of Anesthesiology will be held in the Dowling Surgical Building, Boston City Hospital, on Tuesday, February 11, at 8 p.m.

PROGRAM

Rectal Evipal Dr. H. B. MacEwen
Anesthesia for Ludwig's Angina Dr. P. Marcus

NEW ENGLAND HOSPITAL FOR WOMEN AND CHILDREN

The monthly clinical conference and staff meeting of the New England Hospital for Women and Children will be held on Thursday, February 6 at 7:15 p.m. in the classroom of the nurses' residence. Dr. Z. Eileen Taylor will speak on "Coagulation Defect of Menstrual Blood."

BOSTON SOCIETY OF BIOLOGISTS

There will be a meeting of the Boston Society of Biologists on Wednesday, February 19, in the lecture room, Eastman Building, East Wing, Massachusetts Institute of Technology, at 8 p.m. Dinner will be served in the Silver Room, Walker Memorial Building, at 7 p.m.

PROGRAM

A New Projection Oscillograph for the Observation of Electrical Potentials in Tissues. Dr. J. Warren Horton.

Proliferation-Promoting Factors (Wound Hormones) from Injured Cells. Dr. John R. Loofbourow.

Physiologic Effect of Decreased Body Temperature in Human Beings. Dr. John H. Talbott.

HARVARD MEDICAL SOCIETY

There will be a meeting of the Harvard Medical Society on Tuesday, February 11, in the amphitheater of the Peter Bent Brigham Hospital at 8:15 p.m. Dr. Soma Weiss will preside.

PROGRAM

Presentation of cases.

Pneumonia. Dr. Maxwell Finland.

Beginning with the February 11 meeting, the Harvard Medical Society will meet on the second Tuesday of each month rather than bimonthly as in the past.

ROBERT BRECK BRIGHAM HOSPITAL

There will be a staff meeting of the Robert Breck Brigham Hospital on Tuesday, February 11, in the hospital, 125 Parker Hill Avenue, Boston, at 7:45 p.m.

PROGRAM

The Present Status of Physiotherapy in the Treatment of Chronic Arthritis. Dr. Arthur L. Watkins. Discussion by Drs. Robert B. Osgood and Hallowell Davis.

Physicians and medical students are cordially invited to attend.

WALTHAM MEDICAL MEETING

There will be a clinicopathological staff conference of the Metropolitan State Hospital on Thursday, February 6, at 8 p.m. A case of amyotrophic lateral sclerosis will be presented by Drs. Clementine McKeon and Richard C. Wadsworth. It will be discussed by Dr. James B. Ayer.

All interested physicians are cordially invited to attend.

FELLOWSHIP OPPORTUNITIES

A limited number of fellowships have been provided by The Commonwealth Fund and other sources for extramural training in psychiatry, especially that of children. These fellowships are to be administered by the National Committee for Mental Hygiene, through whom fellows are to be assigned for one or two years to a selected child guidance clinic, the term and plan of the fellowship to be determined by the peculiar needs of the fellows. Candidates for fellowship should have had at least two years of psychiatry in an approved mental hospital, in addition to other qualities fitting them for extramural service. These fellowships come in response to a definite paucity of personnel in this field. Accordingly, other conditions, such as age, sex and marital status, must be governed by individual cases and by the nature of current demand. Re-

quests for further information about these fellowships, and applications therefor, should be addressed to Dr. Milton E. Kirkpatrick, National Committee for Mental Hygiene, Room 916, 1790 Broadway, New York City.

ELLA SACHS PLOTZ FOUNDATION

During the seventeenth year of the Ella Sachs Plotz Foundation for the Advancement of Scientific Investigation, eighty-one applications for grants were received by the trustees, fifty-one of which came from the United States, the other thirty coming from fifteen different countries in Europe, Asia, North and South America. The total number of grants made during this year was twenty-three, one of these being a continued annual grant.

In the seventeen years of its existence the Foundation has made three hundred and ninety-four grants which have been distributed to investigators in Arabia, Argentina, Austria, Belgium, Brazil, Canada, Chile, China, Czechoslovakia, Denmark, Egypt, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, India, Iraq, Italy, Latvia, Lebanon, Netherlands, North Africa, Norway, Palestine, Poland, Portugal, Roumania, South Africa, Sweden, Switzerland, Syria, Venezuela, Yugoslavia and the United States.

In their first statement regarding the purposes for which the fund would be used, the trustees expressed themselves as follows:

For the present, researches will be favored that are directed toward the solution of problems in medicine and surgery or in branches of science bearing on medicine and surgery.

As a rule, preference will be given to researches on a single problem or on closely allied problems; it is hoped that investigators in this and in other countries may be found, whose work on similar or related problems may be assisted so that more rapid progress may be made possible.

Grants may be used for the purchase of apparatus and supplies that are needed for special investigations, and for the payment of unusual expenses incident to such investigations, including technical assistance, but not for providing apparatus or materials which are ordinarily a part of laboratory equipment. Stipends for the support of investigators will be granted only under exceptional circumstances.

In the past few years the policy outlined in the second paragraph has been neglected. During the present great need for funds, grants will be given in the sciences closely related to medicine without reference to special fields. The maximum size of grants will usually be less than \$500.

Applications for grants to be held during the year 1941-1942 must be in the hands of the Executive Committee before April, 1941. There are no formal application blanks, but letters asking for aid must state definitely the qualifications of the investigator, an accurate description of the research, the size of the grant requested and the specific use of the money to be expended. In their requests for aid, applicants should state whether or not they have approached other foundations for financial assistance. It is highly desirable to include letters of recommendation from the directors of the departments in which the work is to be done. Only applications complying with the above conditions will be considered.

Applications should be sent to Dr. Joseph C. Aub, Collis P. Huntington Memorial Hospital, 695 Huntington Avenue, Boston, Massachusetts, U. S. A.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, FEBRUARY 2

SUNDAY, FEBRUARY 2

14 p.m. Modern Advances in Surgery Dr Oliver W. Cope. Free public lecture Harvard Medical School Building D

14 p.m. Present Day Obstetric Practice Dr Alonzo A. Paine Public health lecture Cambridge Hospital Margaret Jewett Hall

MONDAY, FEBRUARY 3

12-15-15 p.m. Clinicopathological conference Peter Bent Brigham Hospital amphitheater

TUESDAY, FEBRUARY 4

12-15-15 p.m. Clinicopathological conference Peter Bent Brigham Hospital amphitheater

8-15 p.m. Experimental and Therapeutic Research on Snake Venoms Dr David I. Macht Greater Boston Medical Society Beth Israel Hospital auditorium

WEDNESDAY, FEBRUARY 5

12 m. Clinicopathological conference Children's Hospital

2-4 p.m. The Unconscious Patient Drs E. C. Cutler and Soma Weiss Peter Bent Brigham Hospital

THURSDAY, FEBRUARY 6

8-30 a.m. Combined clinic of the medical surgical orthopedic and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital at the Children's Hospital

7-15 p.m. Coagulation Defect of Menstrual Blood Dr Z. Eileen Taylor New England Hospital for Women and Children

*Open to the medical profession
†Open to the public

FEBRUARY 5—Wachusett Medical Society Page 135, issue of January 16

FEBRUARY 6—Waltham Medical Meeting Page 218

FEBRUARY 11—New England Society of Anesthesiology Page 217

FEBRUARY 11—Harvard Medical Society Page 218

FEBRUARY 11—Robert Breck Brigham Hospital Page 218

FEBRUARY 12—New England Dermatological Society Page 134 issue of January 16

FEBRUARY 13—Pentucket Association of Physicians Page 263 issue of August 15

FEBRUARY 19—Boston Society of Biologists Page 218

FEBRUARY 20-22—American Orthopsychiatric Association Inc Page 999 issue of December 12

MARCH 8—American Board of Ophthalmology Page 201, issue of August 15

MARCH 12-14—New England Hospital Assembly Hotel Statler, Boston

MARCH 21-22—New York University College of Medicine Alumni Day Page 135 issue of January 16

APRIL 21-25—American College of Physicians Page 1065, issue of June 20

MAY 21-22—Massachusetts Medical Society Boston

JUNE 2-6—American Medical Association Cleveland Ohio

OCTOBER 14-17—American Public Health Association Page 135 issue of January 16

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

FEBRUARY 5—Gastric and Duodenal Ulcer Diagnosis and treatment Dr Arthur Allen Lynn Hospital

MARCH 5—X-ray in Heart Disease Dr Merrill C. Sosman Essex Sanatorium Middleton

APRIL 2—Pediatric Problems in General Practice Dr Joseph Garland Addenbrooke Hospital Gloucester

MAY 14—Relation of the Doctor to the Law Mr Leland Powers New Ocean House Swampscott

FRANKLIN

MARCH 11

MAY 13

Meetings will be held at 11 a.m. at the Franklin County Hospital Greenfield

NORFOLK

FEBRUARY 25—Medicolegal meeting 8-30 p.m. Hotel Puritan Boston

MARCH 25—To be announced

MAY 8—Censors meeting Hotel Puritan

SUFFOLK

APRIL 30—Page 604 issue of October 10

WORCESTER

FEBRUARY 12—Worcester State Hospital Worcester

MARCH 12—Memorial Hospital Worcester

APRIL 9—Hahnemann Hospital Worcester

Supper at 6:30 p.m. followed by a business meeting and scientific program

BOOK REVIEWS

Physical Diagnosis By William Nance Anderson, MD 8°, cloth, 424 pp., with 92 illustrations Philadelphia Lea & Febiger, 1940 \$4.75.

It is interesting that a field like that of physical diagnosis, in which so very little is going on, should continue to produce such an abundance of modern textbooks. There is always someone eager to tell us once again the old familiar story of Williams's tracheal tone, of Gerhardt's sign, of Traube's semilunar space and of Litten's phenomenon, and to give us the newest slant on stoddard tympany.

Most of these books are too big. All that a student of physical diagnosis need know could easily be contained in a pocket manual of less than two hundred pages. If such authors were entirely realistic, they would show the student how to hold his fingers and properly elicit the note of pulmonary resonance, then confide to him the secret that, if one really wants to know whether a patient has pulmonary tuberculosis, the chest is x-rayed.

The author of a manual of physical diagnosis has a few definite obligations to the students who receive their elementary instruction from his text. He should accurately describe the fundamental methods of procedure and should present a few facts in clear and systematic illustration of the results to be obtained through their use. The content of Dr Anderson's book is adequate, and his method of presentation is reasonably good. The grammatical construction, however, leaves a good deal to be desired, and such gross errors as 'Siedlitz' powder, 'Rhefus' tube, 'herz buckle' and 'decubital' artery should not have escaped the proofreader. In all good will it must be said that, although the book should not be condemned, there are half a dozen others on the same subject that are at least its equal. A free use of the editorial blue pencil and the addition of a greater number of illustrations would enhance its appeal.

Psychological and Neurological Definitions and the Unconscious By Samuel Kahn, MD, PhD 8°, cloth, 219 pp. Boston Meador Publishing Company, 1940 \$2.00

This interesting little volume, dedicated to the memory of Sigmund Freud, is a combined psychological dictionary and discussion of the theories of the unconscious and the development of psychoanalysis. It is not exhaustive, only a few of the outstanding psychological theories and conceptions are discussed, but these are preeminently of a psychoanalytic nature. The definitions comprise psychological, psychiatric, psychoanalytic and neurological terms.

The chapters give in turn the history of psychoanalysis, the biography of Freud, the philosophy of the unconscious, its psychoanalytic point of view, and various speculations on unconscious activities. One feature is the author's insistence on a fact that analysts have long emphasized and that has led to the development of training institutes, namely, that a personal or preparatory analysis is necessary before one can successfully practice analytic therapy.

The last chapter of the book comprises an extensive bibliography on psychoanalysis, mental hygiene and educational psychology.

An Index of Treatment. By various authors. Edited by Sir Robert Hutchison, Bart., M.D., LL.D., F.R.C.P., assisted by Reginald Hilton, M.A., M.D., F.R.C.P. Twelfth edition, revised. 8°, cloth, 996 pp., with 148 illustrations. Baltimore: Williams & Wilkins Company, 1940. \$12.00.

This is a standard British reference work. Its popularity may be judged from the fact that the book is now in its twelfth edition since it first appeared in 1907. It had gone through six editions by 1911. The editor, Sir Robert Hutchison, is president of the Royal College of Physicians. There are about seventy-five contributors, all of them British. They include such eminent figures as W. Russell Brain, J. P. Lockhart-Mummery, P. H. Manson-Bahr and Thomas A. Ross. Yet this book has been little used in this country, no recent edition being found, for example, in the Boston Medical Library.

The preface states: "The whole book has again been thoroughly revised and some of the articles entirely rewritten." However, one suspects that revision has been less than complete. For example, although the article on pneumonia does carry one short paragraph on sulfa-pyridine (mentioned only as M.&B. 693), it still includes a long section, headed "To combat toxemia and septicemia," that discusses bleeding, diaphoresis, catharsis and diuresis. The section heading has the following curious footnote: "This section is partly traditional and some of the methods mentioned are probably becoming obsolete." The article on tabes dorsalis still recommends Pyramidon for tabetic pains. In the treatment of tapeworm and roundworm infestation, there is no mention of carbon tetrachloride, tetrachlorethylene or hexylresorcinol.

The book is written, of course, for English use, and many of the proprietary preparations mentioned are limited to that country, as are some of the methods and ways of life discussed. For the most part, however, the text has been brought up to date; the articles are brief and concise, and the book will undoubtedly be of much aid to the general practitioner and student.

Clinical Methods: A guide to the practical study of medicine. By Sir Robert Hutchison, Bart., M.D., LL.D., F.R.C.P., and Donald Hunter, M.D., F.R.C.P. Eleventh edition. 16°, cloth, 622 pp., with 19 color and 8 half-tone plates and 106 figures. New York: Paul B. Hoeber, Inc., 1940. \$5.00.

The eleventh edition of Hutchison and Hunter, the fat, little British equivalent of Seiffert and Mueller, has been reduced to a mere six hundred and twenty-two pages. It is a complete manual of clinical diagnostic procedures, many of them obsolete, from the "examination of vomit" to tables of conversion from imperial weights and measures to "milligrammes" and "centimetres."

The difficulty with imported texts is that no matter how great their time-honored and deserved popularity in the land of their origin, their abundant data do not correspond to American needs. We do not use the Mackenzie-Lewis polygraph, to the description and use of which ten pages are devoted; nor are Gowers's, Haldane's and Oliver's hemoglobinometers, covered in four pages, or Gerrard's hypobromite ureometer, illustrated by a woodcut engraved in 1895, to be found in our hospital laboratories. MacLean's method of estimating sugar in the blood, his urea-concentration test, and the Jenner, Leishman and

Ehrlich tri-acid stains are not in general clinical use in this country. Many other examples might be cited. Any one of the several American house-officers' handbooks that contain information of contemporary value is preferable to even a revised edition of this respected and admirable volume.

Child Care and Training. By Marion L. Faegre and John E. Anderson. Fifth edition, revised. 8°, cloth, 320 pp., with 29 illustrations and 3 tables. Minneapolis: University of Minnesota Press, 1940. \$2.50.

This is one of the best of the home manuals on child care and management—one that can be recommended enthusiastically and without reservation. Its primary aim is to provide a sound and adequate psychological basis for understanding the child, without which all education is indeed futile. And this it does admirably. But the book is by no means restricted to generalities; it answers scores of specific questions about habit formation, learning, family relationships, growing, eating, sleeping, discipline, play, sex education and even the common contagious diseases. Moreover, for the reader who wishes to pursue his inquiries further there are bibliographies at the ends of the several chapters, and there are tables of questions adaptable for classroom use or round-table discussions. One can wish for this book a still wider sphere of usefulness.

Sulfanilamide, Sulfapyridine and Allied Compounds in Infections. By Maurice A. Schnitker, M.D. Edited by Henry A. Christian, A.M., M.D., LL.D., Sc.D. (Hon.), Hon. F.R.C.P. (Can.). 8°, cloth, 72 pp., with 4 illustrations. New York: Oxford University Press, 1940. \$1.50.

The chemotherapy of infections with drugs of the sulfonamide group is a field so new, so vast and so rapidly advancing that it is difficult for the practitioner to assimilate the newer knowledge of this subject and to keep up with its progress.

This small, compact book—reprinted from *Oxford Loose-Leaf Medicine*—will be found tremendously helpful and informative. It reviews the pharmacology, action and methods of administering sulfanilamide and sulfapyridine, the particular infections in which each is or is not effective, the toxic effects and the methods of determining the drugs in the blood, urine and body fluids. The information and directions are so detailed that reference to any other source is unnecessary. The author discusses briefly a few other related compounds, but not recently developed ones, such as sulfathiazole. There is an exhaustive bibliography, and a foreword by Dr. Henry A. Christian.

It Is Your Life: Keep healthy, stay young, live long. By Max M. Rosenberg, M.D. 8°, cloth, 450 pp. New York: The Scholastic Book Press, 1940. \$2.50.

The idea of this book had its origin in the author's occasional practice of distributing to his patients printed folders on the preservation of health and the prevention of disease. The work covers a wide range of subjects and is written in an easy style. Although on the whole the text may serve to teach and guide the average person in his daily mode of living, it should be pointed out that the author frequently presents his material in the spirit of excathedral pronouncement, and that certainly at times he oversteps his experience and discrimination on matters which could be left to those better equipped to pass final judgment.

The New England Journal of Medicine

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VOLUME 224

FEBRUARY 6, 1941

NUMBER 6

SYMPOSIUM ON SULFANILAMIDE AND ITS DERIVATIVES

SULFANILAMIDE IN THE MANAGEMENT OF ACUTE STREPTOCOCCAL, PARTICULARLY SCARLATINAL, INFECTIONS OF THE UPPER RESPIRATORY TRACT*

CONRAD WESSELHOEFT, M.D.†

BOSTON

IN discussing the use of sulfanilamide in streptococcal infections of the upper respiratory tract, it is essential to keep in mind that certain factors influence the natural course of these infections and the efficacy of the drug, and that such controlled clinical investigations as have been made serve merely as preliminary tests, which gauge the value of the drug only under limited conditions in a complex field. Naturally, these considerations lead to generalities, often of a hypothetical and speculative nature, from which diverse opinions are evolved.

Among these upper respiratory infections of streptococcal origin, scarlet fever offers one suitable avenue of approach because of the vast amount of basic statistical material to work from. This disease in a two-year-old child will give rise to an otitis media in almost 50 per cent of the cases, but the susceptibility of the middle ear in this disease decreases as one grows older, until in adults it occurs in only about 5 per cent. This complication varies not only according to age, but also according to the anatomic peculiarities of the patient, the season of the year, the presence of mixed infections,¹ the strain of hemolytic streptococcus obtained from nose and throat cultures² and the various little-known influences connected with the patient's environment. Similar factors pertain to the incidence of the other complications of this disease.

It must be clearly understood that these scarlet-fever strains can produce pharyngitis, tonsillitis, lymphadenitis and all the other complications without producing a rash, provided that the patient

can neutralize the toxin. Furthermore, other strains of streptococci—not of the scarlet-fever order—can give rise to a similar pharyngitis and tonsillitis with fever in all grades of severity, and to the complications that accompany and follow scarlet fever.

In their superficial growth, these various streptococci may call forth a thin layer of fibrin and may also cause marked localized edema. But their invasive power actually governs not only the severity of the local symptoms in and about the throat, but also the incidence of accompanying and subsequent complications. They can induce a mucopurulent discharge from the mucous membrane, especially in the middle ear, the mastoid cells, the nose and its accessory sinuses. In all these positions there is a constant effort of the resisting forces to protect the underlying structure from the streptococci. However, the bacteria may penetrate still deeper and may seriously invade the lymphatics or bone itself, and thus may reach the blood or the meninges.

How does sulfanilamide influence these upper respiratory conditions? Various factors affect its ability to inhibit the growth of hemolytic streptococci. As a class, these bacteria are among the most susceptible to this drug. Nevertheless, certain strains are more susceptible than others.^{3,4} Furthermore, one is not always dealing with a pure strain. Frequently there are mixed infections in which one strain may supersede another in its preponderance of growth. The tissue involved, the tissue reaction invoked by the infection, and the depth of invasion are of the utmost importance. Indeed, the efforts of the natural resisting forces to wall off and localize the infection may also act to prevent sulfanilamide from getting at the streptococci flourishing within the wall. But it is not only in abscess formation that this walling-off takes place, because fibrin thrown

*This and the following four papers were presented at a symposium at the annual meeting of the Massachusetts Medical Society, Boston, May 22, 1940.

†From the Haynes Memorial Hospital, Massachusetts Memorial Hospitals, and the Department of Pediatrics, Harvard Medical School.

‡Clinical professor of communicable diseases, Harvard School of Public Health, associate professor of theory and practice, Boston University School of Medicine, physician in-chief, Haynes Memorial Hospital, Massachusetts Memorial Hospitals.

into and on the surface of the mucous membrane of the upper respiratory tract and the relatively impotent superficial phagocytic cells may protect streptococci flourishing near the surface and in the semifluid on the surface. Especially is this true in certain forms of purulent rhinitis. Thus one is confronted with different problems brought about by the elaboration of the toxin on the one hand, and pyogenic properties on the other.

Ordinarily, the initial invasion of the scarlet-fever infection is a superficial one. The rash is a remote effect of the circulating toxin on the skin capillaries, whereas in erysipelas the skin lesion is the direct result of the streptococci within the tissue fluids in the deeper layers of the skin itself. Consequently, sulfanilamide, or the form in which it operates, encounters more difficulty in reaching the superficial lesions of the upper respiratory tract in scarlet fever than it does in affecting the deep skin lesions of erysipelas. Therefore, one should not expect, nor does one obtain, parallel results in the two diseases from the administration of this drug.

Scarlet fever offers an excellent opportunity to investigate the action of sulfanilamide. Given as a routine by mouth throughout the febrile stage in the accepted dosage,* this drug has failed to benefit in any way the eruptive stage in eight clinical studies,⁵⁻¹² comprising a total of 1239 cases tested against 1220 controls. One of these studies was conducted at the Haynes Memorial Hospital, the results of which conformed with the others in this respect: the fever was neither lowered nor shortened, nor was any improvement noted in the rash or sore throat that could be attributed to the drug, as determined by a comparison with the control series.

Tonsillitis is a usual manifestation of the initial stage of scarlet fever, and in our series it showed no apparent improvement as the result of the usual dosage of the drug. Why, then, should the non-scarlatinal forms of pharyngitis and tonsillitis be expected to yield to this or to smaller doses? A controlled study failed to show that they do.¹³ Both types of tonsillar disease represent invasion, and the only difference lies in the local toxic effects in scarlet fever.

However, if scarlet-fever antitoxin or convalescent serum is administered within the first twenty-four hours, one usually obtains a dramatic drop in the fever, a blanching of the rash and a distinct improvement in the inflamed throat. Here the improvement in the condition of the throat is due to neutralization of the erythrogenic toxin and indirectly to a checking of the bacterial invasion. Thus one can control the toxic stage by the

early use of antisera, which will lower the incidence of complications during the first week to an appreciable degree. But scarlet-fever antisera exert no more effect on the pyogenic complications, once they have become established, than sulfanilamide exerts on the initial toxic stage.

The next question is whether sulfanilamide can prevent these pyogenic complications. In four of these clinical tests the drug was continued only during the febrile stage. The combined results of the tests^{5-7, 9} (474 treated cases, 587 controls) showed no diminution in the incidence of complications. Furthermore, in England,^{9, 10} a combination of the drug with scarlet-fever antitoxin was used in 317 cases and controlled by 329 cases in similar age groups treated with antitoxin alone. Again no diminution of the complications occurred as a result of the sulfanilamide, in spite of this additional antibody supply. On the other hand, Benn¹¹ and Silverman¹² showed a moderate reduction in the pyogenic complications among their drug-treated cases. All these clinical observations are of necessity unsatisfactory and incomplete, since the results always suggest some other approach in the manner of administering the drug, if not some newer allied preparation.

In a series of 350 cases reported by Thenebe and his associates¹⁴ at Hartford,—in which the usual dosage was given on the first day, reduced over a period of the next three days, and then maintained at half the original dose for another four days,—a low percentage of complications occurred as compared with that in previous years, but a very high percentage of toxic effects from the drug was recorded.

In another series—that of Sako and his associates⁸ in Minneapolis—the drug was used without antitoxin and was continued on an average of twelve days. Here a very marked diminution in the incidence of complications was reported in the drug-treated cases. The authors remark that “the best results were obtained when sulfanilamide was continued during the entire convalescent period,” but they fail to state how many were so treated and what their ages were.

All the complications of scarlet fever may occur at any time during the course of the disease. Schick,¹⁵ years ago, drew attention to the “second danger period,” extending into the third or the fourth week. The continued use of sulfanilamide over a three or four weeks’ period brings up the question of the dangers from its use, especially in the home. Cases so treated would certainly require closer supervision, with frequent blood counts, and thus add to the cost of medical care. This, of course, would be well worth while if complications could be avoided or reduced to the minimum obtained in the Minneapolis series.

*Sixty to 90 gr. daily by mouth was used for full-grown patients, with proportional reductions according to weight down to 20 to 40 gr. daily.

From a practical standpoint it means hospitalization of all cases of scarlet fever, a reversal of the present tendency toward isolation in the home.

Jewell¹⁶ has recently reported on the use of small doses of sulfanilamide (2 to 5 gr thrice daily) as a prophylactic for scarlet fever. Similar spectacular results were offered sixty years ago in favor of belladonna in this same capacity. The references on the latter subject fill two columns of the *Surgeon General's Catalogue*. The control method of investigation will eventually give the true answer to the prophylactic value of sulfanilamide in this disease, as it did for belladonna.

In other contagious diseases not of streptococcal origin, hemolytic streptococci are, nevertheless, frequently the cause of complications. Thompson and Greenfield¹⁷ used sulfanilamide in measles and whooping cough in the usual dosage, followed by a maintenance dose in carefully controlled age groups. The drug showed no effect whatever on the eruptive phase of measles or on the paroxysmal manifestations of pertussis, but the incidence of bronchopneumonia was reduced in both diseases in the drug-treated series. Furthermore, there was a material reduction in the incidence of otitis media in the 400 cases of measles that were given sulfanilamide, comparable with the results obtained by Siko and his associates in scarlet fever with a maintenance dosage. Here, again, one must weigh the prophylactic value of this continued method with the actual days of illness caused by the drug—by no means a minor item, even in children, in whom it is relatively well tolerated.

Sulfanilamide is exceedingly valuable in reducing the mortality that follows the onset of serious complications. In scarlet fever the majority of the deaths today are due to the end results of pyogenic infections, particularly of the mastoid cells, in which the blood stream or the meninges become invaded. In these two serious complications, bacteremia and meningitis, the death rate has been so markedly reduced as to make me enthusiastic.

As to the use of sulfanilamide in purulent rhinitis, sinusitis and suppurative otitis media, our experience at the Haynes Memorial Hospital is very conflicting. Some cases with and without evidence of septic toxemia appear to have responded, whereas in others the results are disappointing. This experience in scarlet fever corresponds to the conflicting reports in the literature in these same conditions not of scarlatinal origin. Evidence on this point must be carefully sifted before anything beyond impressions can be given.

In 54 cases of suppurative otitis media in the course of scarlet fever we have given sulfanilamide

from the onset of the aural discharge in 14 and later in 40. In this preliminary report I can say only that the duration of the discharge and the incidence of mastoid infection requiring surgical intervention have not been reduced below the average. One thing that we have learned is that a mastoiditis may be subdued so far as the purulent aural discharge is concerned, yet bone destruction continues, and precious time has been wasted.¹⁸ Furthermore, the white cell count and differential count can be distorted by the drug, likewise the x-ray evidence, as pointed out by Law,¹⁹ thus making it more difficult to interpret the true condition of affairs in the mastoid cells.

Different strains of hemolytic streptococci appear to have various predilections for their original attack. For example, it is fairly unusual for the scarlatinal strains to attack the larynx; yet other strains of hemolytic streptococci can bring about an epidemic of croup. Here one may be confronted by a problem in the use of sulfanilamide. I refer to obstructive laryngitis. At the Haynes Memorial Hospital we have seen 3 cases of severe obstructive streptococcal laryngitis which, before admission, were given sulfanilamide to the point of cyanosis, without improvement. Nor were these due to the viridans type of streptococcus, which is known to be resistant to this drug. Cyanosis and signs of fatigue constitute indications for laryngoscopic examination, suction and, if necessary, intubation, or, in extreme danger, for a prompt indirect intubation. Of course, the cyanosis of sulfanilamide would never alone bring one to this step, but in the presence of increasing obstruction it can handicap one's judgment.

Two one-year-old infants with streptococcal laryngitis were recently admitted to the Haynes Memorial Hospital, both with marked funnel-like recessions of the sternum with each inspiration. They did not develop excessive fatigue or cyanosis, and recovered with moist air inhalations alone. Sulfanilamide was not used.

Intubation is a much more serious step here than in diphtheria, owing to the danger of ulceration if the tube is left in place more than forty-eight hours. Intubation, therefore, with a streptococcal infection is a temporary procedure to afford sufficient sleep and rest and a chance to combat dehydration before a tracheotomy, and to supply free air passage during the tracheotomy, which is done under local anesthesia. In spite of advances in the technique and aftercare of tracheotomy, the dangers of bronchopneumonia and tracheal encrustations continue to make this operation a great risk. Any drug that induces cyanosis in the presence of laryngeal obstruction might mislead one into unnecessary operative interference. Sulfathiazole

zole, which does not appear to have this drawback, is now under investigation.

In spite of appearing inconsistent because of inferences to be drawn from our experience in scarlet fever and obstructive laryngitis, I am of the opinion that drastic chemotherapy is indicated in any desperate, fulminating, highly toxic infection of the faucial space and trachea suggestive of streptococcal infection before any culture reports are obtained; and if the cultures are positive for hemolytic streptococcus, I should add immunotransfusion. But I am opposed to its indiscriminate use in the minor upper respiratory infections, except those under investigative control.

In the management of the streptococcal infections of the upper respiratory tract one should be aware of the factors that govern the natural course of the disease and those that interfere with the ability of the drug to get at the bacteria, the variations in their susceptibility and the limits, as well as the dangers, of its use. Nor should one neglect all those useful measures that afford relief, comfort and the saving of life. Improvements in chemotherapy may yet fulfill our hopes in the treatment of these upper respiratory streptococcal infections, but much investigation lies ahead. At present the outstanding value of sulfanilamide appears to be in those sequelae of these infections in which the streptococci have penetrated into the blood stream, the meninges or the lungs.

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REFERENCES

1. Wesselhoef, C. Factors influencing the incidence and course of otitis media in scarlet fever. *Ann. Int. Med.* 12:1473-1485, 1938.
2. Gunn, W. and Griffith, P. Bacteriological and clinical study of one hundred cases of scarlet fever. *J. Hyg.* 28:250-266, 1928.
3. Kiefer, C. S. Sulfanilamide: its mode of action and use in the treatment of various infections. *New Eng. J. Med.* 219:562-571, 1938.
4. Long, P. H. and Bliss, E. A. *The Clinical and Experimental Use of Sulfanilamide, Sulfapyridine and Allied Compounds*. 319 pp. New York: Macmillan Co., 1939. P. 126.
5. Peters, B. A. and Havard, R. V. Chemotherapy of streptococcal infections with *p*-benzylamino-benzene-sulphonamide. *Lancet* 1:1273, 1937.
6. Schwentker, F. F. and Waghelein, J. A note on the use of sulfanilamide in scarlet fever. *Baltimore Health News* 15:41-46, 1938.
7. Wesselhoef, C. and Smith, E. C. The use of sulfanilamide in scarlet fever. *New Eng. J. Med.* 219:947-953, 1938.
8. Sako, W., Dwan, P. F. and Platou, E. S. Sulfanilamide and serum in the treatment and prophylaxis of scarlet fever. *J. A. M. A.* 111:995-997, 1938.
9. Peters, B. A., Woodman, D. and Lewis, F. J. W. Chemotherapy in fever hospital practice. *M. Officer* 62:55-57, 1939.
10. Hogarth, J. C. Para-benzylaminobenzenesulphonamide in the treatment of scarlet fever. *Brit. M. J.* 2:1160-1162, 1937.
11. Benn, E. C. Sulphanilamide in the treatment of scarlet fever. *Brit. M. J.* 2:644-646, 1939.
12. Silverman, A. C. Sulfanilamide in the treatment of scarlet fever: need for research point of view. *New York State J. Med.* 40:317-325, 1940.
13. Rhoads, P. S. and Afremow, M. L. Sulfanilamide in treatment of sore throat due to hemolytic streptococci with controls. *J. A. M. A.* 114:942, 1940.
14. Thenebe, C. L., Hirshberg, M. S. and Bobrow, A. Three hundred and fifty cases of scarlet fever treated with sulphanilamide and neoprontosil. *J. Conn. M. Soc.* 3:351-353, 1939.
15. Schick, B. Die Nachkrankheiten des Scharlach. *Jahrb. f. Kinderh.* 65:132-173, 1907.
16. Jewell, L. E. The use of sulfanilamide as prophylaxis for scarlet fever. *J. A. M. A.* 114:1478, 1940.
17. Thompson, A. R. and Greenfield, C. R. M. Chemotherapy in measles and whooping cough: prophylaxis and treatment of complications. *Lancet* 2:991-994, 1938.
18. Maybaum, J. L., Snyder, E. R. and Coleman, L. L. The value of sulfanilamide in otogenous infections: with special reference to its masking effect. *J. A. M. A.* 112:2589-2592, 1939.
19. Law, F. M. discussion of Rosen, S. Acute mastoiditis masked by sulfanilamide. *Laryngoscope* 49:1149, 1939.

DISCUSSION

DR. GORDON BERRY, Worcester: The subject of chemotherapy is broad and complex. I know you join with me in wishing that the time would permit a wider development of the theme by so authoritative a speaker as Dr. Wesselhoef.

It should be remembered that in streptococcal infections, a specialized type of membrane is being considered and that each infection invades this membrane in the same way. Through the agencies of local edema, the deposit of a fibrin layer on and in the superficial tissues and the local increase of phagocytic leukocytes, Nature is delaying, or preventing the entry and spread of the bacteria, is trying to wall off the process and isolate it. I cannot speak authoritatively about the chemical or pathologic changes that occur, but I can fittingly emphasize the point made here, namely, that sulfanilamide is blood borne, and that the very barriers Nature establishes in its effort to wall off the process automatically inhibit the drug from reaching the infection. Further, if there is central necrosis and pus formation, the pus is beyond the reach of this drug. Here if Nature cannot cure, only mechanical drainage will serve.

Although antisera markedly inhibit the initial attacks of streptococcal infections, but not the later complications, sulfanilamide, even if started early and energetically and continued in gradually diminishing doses, does not lessen the initial attack, but does lessen the pyogenic complications. Some would question this, and further research is necessary to settle the point.

I shall now discuss ear complications, which are of particular interest to me as an otolaryngologist. In a series of 54 cases of acute suppurative otitis media, the administration of sulfanilamide did not reduce the duration of the discharge or the incidence of mastoiditis requiring surgical intervention. These negative findings are supported by many of my confreres, but are contrary to the reports of those enthusiasts who claim a startling abatement in ear infections from prompt chemotherapy in all cases.

Let me introduce two contrasting reports. The first, in favor of chemotherapy, is through the courtesy of Dr. Mary S. Holmes, the superintendent at Belmont Hospital, where Worcester's acute contagious cases are handled. The material was assembled by her assistant, Dr. Florence H. Knowlton. This hospital makes a routine practice of administering sulfanilamide (1 gr. per pound of body weight) in all scarlet-fever cases. To protect against sensitivity, the drug is continued for only five days unless the severity of the case or secondary complications urge a continuance. What are the results? The scarlet-fever death rate for the preceding ten years was 1.5 per cent. For the two years of sulfanilamide therapy, 840 cases resulted in 5 deaths, a rate of 0.6 per cent. The incidence of acute otitis media for all ages was 6.8 per cent in an untreated series of 1018 cases and 2.5 per cent in a treated series of 827 cases. These figures show a gain of about two and a half times. Mastoidectomy, not infrequent in the untreated series, was a rarity in the treated. In 1935 and 1936 the average hospital stay for scarlet fever with otitis media was 47 days. In 1938, when the drug was used as a routine, the average stay was reduced by a half, to 23 days. The fever and the rash disappeared promptly in most of the treated cases. Antiserum was used in a little less than one quarter of the cases in both series. Dr. Holmes credits these results to the sulfanilamide therapy, and also to the isolation of each case in a separate room, thus avoiding cross infections. In over 1000 cases administered sulfanilamide in this hospital, no serious toxic complications were caused by the drug.

The second report reflects the more conservative attitude of most otologists. Dr Edmund P. Fowler, Jr.,* has listed the types of organisms found in cultures from aural discharges at the Columbia Presbyterian Medical Center in New York during the last seven years. Such cultures should indicate the primary offending organism. But it must be borne in mind that secondary infections early enter from the nasopharynx or from the skin of the external auditory canal, and that the resulting mixed infection complicates therapy. Sulfanilamide may be helping the streptococcal infection while a complicating staphylococcus is causing serious secondary trouble. The total number of cases in this New York series was 2755. Of these over 35 per cent showed staphylococcus, and more than 15 per cent, other organisms, thus over 50 per cent were not susceptible to any known specific chemotherapy. (Sulfapyridine and sulfathiazole are offered for staphylococcal infections, but they are not yet considered specific remedies.) About 30 per cent of this series showed hemolytic streptococci, for which we have sulfanilamide, and about 15 per cent were due to pneumococci for which we have sulfapyridine. A second study showed the duration. In a series of 455 cases of acute suppurative otitis media that did not receive chemotherapy, and a hospital is likely to see the worst forms,—the total duration of the ear discharge in all types of infection was less than one week in 68 cases, less than two weeks in 209, and less than three weeks in 269. Of the 264 cases with pneumococcal and streptococcal infections, including the severe complications, three quarters of the patients got well within three weeks without chemotherapy. Dr Fowler reasons that acute otitis media is usually a self-limited disease and that too many cures are being attributed to chemotherapy. He thinks a fair estimate of cures by such means, as against former measures, would place the gain at less than 5 per cent. His figures show that less than half the cases of otitis media lend themselves to chemotherapy and that three quarters of this possible half recover about as promptly without the use of the specific drug. He concludes that perhaps one eighth of all cases of acute otitis media need chemotherapy.

In considering infectious processes in this region, one should bear in mind that all these cavities are bony, epithelial lined air chambers connected with the central airway. The middle ear and mastoid may be thought of as a modified paranasal sinus. An acute nasal cold always involves to a degree the easily accessible ethmoid cells. If it extends through the eustachian tube, the infection involves the mastoid cell membrane almost as soon as that of the tympanum. We shall clarify our reasoning if we accept this early involvement of these contiguous cavities. Treatment may employ belladonna as of old, or the sulfanilamide of today, but locally we must seek and secure drainage of these adjacent cavities. Dr Wesselhoef explains why the sulfanilamide will not reach them. To drain the paranasal sinuses, we shrink the turbinates and ostia; for the middle ear, we shrink the eustachian tube. If the ear fails to gain, then we must seek surgical drainage through the eardrum or later through the mastoid cortex.

Up to this point most otologists rarely use chemotherapy. I cannot see the wisdom or logic in using the drug in mild self-limited nasal and aural infections or in a localized suppurative mastoiditis. Why submit a patient, who probably will get well promptly, to such a heavy broadside, with its known dangers? And the drug masks the symptoms, as Dr Wesselhoef has pointed out. The

fever may drop, the pain and discharge may cease, the drum membrane may heal and the hearing may return, and still one may be forced to operate, finding an active pocket of pus in the mastoid. I insist, therefore, on surgical drainage when I think it called for. I have almost invariably regretted an undue reliance on chemotherapy. There are two exceptions to this initial postponement of sulfanilamide. One is an acute fulminating streptococcal infection, regardless of its locality, here the infection is breaking through Nature's barriers, and one must call on the reserves at once. The second exception is an acute streptococcal mastoiditis, for which a free myringotomy has been done and which is hanging in the balance. A short intensive course of sulfanilamide therapy, gradually withdrawn, may favorably turn the scale. But its masking effect, in addition to its hazards, must be carefully borne in mind.

One possibility not yet finally evaluated is its local use. Sulfanilamide in powder form can be applied directly to infected surface tissues, or Neoprontysil in solution can be injected into cavities. Some claim good results, others are not certain.

Except for this possible local use and until the experts recommend smaller and safer doses, one should tend to reserve this modern offensive weapon for the major battle. At any point when the infection looks as though it might seriously reach beyond Nature's normal barriers, then call on this reserve, unstintingly. Dr Fowler accepts a week to ten days of the infection as an arbitrary limit if the infection is not under control by then, use the drug. This is a helpful rule. Some of us prefer to consider each case individually and call on this help promptly when we think that convalescence is not progressing well. Please note the time limit seven to ten days. But experts in chemotherapy say that the hazards from drug sensitivity tend to develop from the seventh to the tenth day. Many withdraw the drug then in order to avoid these hazards. This is just the time the otologist begins to need the drug for the severe complications that may develop. The obvious question is, Why use up this valuable aid when one does not need it, and withdraw it at the time when one may sorely need it? The otologist concludes reserve the drug for these later complications.

I cannot here go into a detailed consideration of the dangers of chemotherapy. We have all experienced them. Although sensitivity develops more frequently from the seventh to the tenth day, it may develop more promptly. And although we are urged to force the drug in massive doses right at the start, small doses as well as large can bring on these unfortunate reactions. The doctor must therefore decide first whether with a little waiting the patient can get the best of the infection without the drug and secondly, whether, if he uses the drug, the expected gain is greater than the hazard. And bear in mind that a good many patients whose cures have been attributed to chemotherapy would have recovered anyway.

At the last meeting of the New England Otological and Laryngological Society, Dr Champ Lyons gave a masterly dissertation on chemotherapy, urging its prompt and energetic use. If the proper and specific drug is available for an acute middle ear infection, he urges its use right at the start, in heavy doses and with the patient hospitalized, always. If the drug is doing what it should do the fever will be down and the ear dry within forty-eight hours. But such an intelligent and drastic effort predicates expert laboratory checking not only of the drug content in the blood and its effect on the red and white blood cells, but of the immune bodies present. If these immune bodies are abundant the drug is less need

*Fowler, E. P., Jr. Otitis media and its extensions. *J. N. Y. Acad. Med.* 16:24-37, 1940.

ed; if they are lacking, he recommends not only chemotherapy but the considered use of antiserums. In such expert hands, chemotherapy becomes an exact science, and its reactions and hazards are known and understood. As yet the average hospital and laboratory enjoys neither the financial resources nor the technical skill for these elaborate procedures in routine practice. And very few patients can afford to call a mild earache a major hospital disease, even though serious complications may be brewing. In the meantime it is to men like Dr. Wesselhoef and Dr. Lyons that we gratefully look for safe and wise leadership in this remarkable field of chemotherapy.

This brings me to Dr. Wesselhoef's final point: the use of sulfanilamide in streptococcal extensions from the ear and mastoid, or from the nose and paranasal sinuses, to the meninges or to the blood stream. Here otologists are in complete accord: begin the therapy at the first suspicion of trouble. The patient is in the hospital and has been under observation. The culture report has been made, the blood and kidney condition is known. Now use the drug promptly and in massive doses. Keep the fluid intake down to hasten the blood saturation—8 mg. per 100 cc. is usually enough, but do not hesitate to go to 12 mg. or even higher. To the otologist who formerly labored

frantically but without avail on his meningitis and sinus-thrombosis cases, the results are little short of miraculous. The case is desperate, surely, but the patient now has a good chance of recovery, provided of course that any necessary surgical drainage has first been secured. Here the drug hazard does not weigh in the balance against the great gain to be secured.

The one caution that experience indicates is not to withdraw the drug too soon. I have operated on the mastoid, controlled the meningitis, withdrawn chemotherapy and sent the patient home apparently well, only to have him hurried back to the hospital in a few days with a second attack of frank meningitis. Fortunately, more sulfanilamide is usually successful in bringing about a lasting cure.

One thing we now hope for is a drug that can be used with safety and in small prophylactic doses. We need therapy that can be administered at the office or at the home, and that will control the infection in its initial stages. Until chemical research corrects the known faults and makes laboratory control simpler, otolaryngologists will tend to hold this most valuable agency as a reserve against serious secondary complications. In the meantime, discussions like these will clarify the existing confusion and will help to guide our procedures.

THE TREATMENT OF PUERPERAL SEPSIS*

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THE advance of knowledge in chemotherapy has stimulated interest in the treatment of puerperal sepsis. Despite this, however, it should be kept constantly in mind that the keynote of emphasis should remain the prevention of the disease. The vaginal tract rarely harbors organisms that are productive of serious infections. These organisms are introduced extragenitally. According to Chandler¹ the incidence of Group A strains of the beta-hemolytic streptococcus in the vagina before delivery is 0.25 per cent, yet in patients with severe puerperal infections almost 100 per cent of the strains isolated bacteriologically are in Group A. The treatment of puerperal sepsis, therefore, begins with preventive measures in the prenatal period, continues with rigid adherence to aseptic principles throughout the intra-partum phase and is not concluded until the post-partum period is completed.

Ante partum, patients should be admonished against intravaginal manipulation, particularly in the last month of pregnancy. They should be instructed not to take douches; coitus should be interdicted.

To protect the patient during delivery, the delivery room should not be used for surgical prac-

tice, masks should be worn by all attendants, and patients harboring intercurrent infections should be delivered under conditions that ensure isolation. Proper sterilization of the instruments and gloves is fundamental. Persons who are known to have respiratory infections should be kept out of the delivery room, and if the patient herself has a respiratory infection, every precaution should be taken to avoid autoinfection. Patients must be shaved, and scrupulous aseptic technic should be practiced during delivery. Vaginal examinations should be reduced to a minimum during labor, even though they may be conducted with a rigid technic. As a matter of fact, the progress of labor is readily followed under most conditions by rectal examinations. Prior to delivery the patient should be draped with sterile sheets after preparation of the skin and vulva with suitable antiseptics, and the operator scrubbed as if for the most important surgical adventure, for so the simplest obstetric case may turn out to be.

Post partum, all patients are isolated who have a temperature of 101°F. for a period of a few days, particularly when accompanied by chills, elevated pulse, headache, anorexia, and nausea and vomiting. Prompt isolation will reduce the incidence of epidemics. One should rule out engorged breasts, gastrointestinal disorders and known contagious diseases that do not require isolation. Patients who are to be isolated are

*Presented at the annual meeting of the Massachusetts Medical Society, Boston, May 22, 1940.

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placed in a separate ward or building under the charge of nurses who have no responsibilities with other patients. Wards are frequently scoured, fresh linen is given daily to each patient, bedpans are sterilized before they are used, and nurses are taught a rigid technic in the use of antiseptics. Nurses with local or pulmonary infections should be removed from duty. These details of prophylactic care are essential to reduce the spread of puerperal infections and are of prime importance in the treatment and eradication of the disease.

Since devitalized tissues play an important role in creating conditions favorable to the growth of organisms,² the attendant must avoid traumatization; his judgment must be good, his skill ingenious. This means early selection of cases for cesarean section, preferably before rupture of the membranes and within twelve hours of the onset of labor. One should adhere to the precepts of delivering patients vaginally only at full dilatation, and when the delivery is instrumental, of employing gentle traction after an intelligent application of forceps. Except in cases of retained placenta or post-partum hemorrhage, the completion of the third stage of labor without intrauterine exploration is vital.

To give intelligent care to an obstetric patient who is septic, that patient should be properly evaluated not only from the evidence furnished by signs and symptoms of the disease but also by bacteriologic and hematologic studies. To clarify diagnosis, to aid in prognosis and to render intelligent therapy one should know what organism or organisms one is dealing with and whether the infection is localized or in the blood stream; therefore, cultures should be taken from the cervix and the uterus, and blood cultures should be obtained early, and repeated if negative. At the same time blood studies are conducted to determine the red-cell and white-cell counts. The streptococcus, staphylococcus, pneumococcus, colon bacillus and gonococcus are the commonest infecting organisms of the genital tract of the parturient woman. The infections that most seriously jeopardize the patient's life are for the most part confined to beta-hemolytic streptococcus. Almost all human strains of the beta category fall into Group A. Other streptococci produce only partial hemolysis, and certain anaerobic types have the vagina as a normal habitat and are not pathogenic.

Since most of the puerperal infections tend to remain localized in the cervix, uterus or parametrium, the uterus should be kept contracted with oxytocics used orally or parenterally. Ergot and pituitary extract are given early post partum and

are continued for the first three to five days. Intrauterine procedures such as douches or curettage are contraindicated^{2, 3}; they disseminate infection and may prove fatal.

In generalized blood infections, the hemolytic streptococcus acts by invasion and growth in the host and by the elaboration of toxins. The body mechanism employs phagocytosis and intracellular digestion to oppose this growth. The bacteria may develop a protective mechanism—a capsule—that hinders the phagocytic process. Since sulfanilamide, sulfapyridine and sulfathiazole have been found to be bacteriostatic in vitro and in vivo, they have become utilizable in the production of bacteriostasis.

But this is not always enough. It was found that this phagocytic action might be increased by the presence in the blood of a specific antibody that is antibacterial in nature and sensitizes the organism. This specific antibody, termed opsonin, can be evaluated in the laboratory by blood examination. Therefore, in those patients who possess a low opsonic index, the opsonin may be increased by the transfusion of blood from an immune donor or one found to possess a relatively high antibody content. Treatment by means of sulfanilamide in combination with immune transfusions seems ideal. Colebrook and Purdie⁴ showed reduction in the total case fatality rate in puerperal sepsis of 62 per cent, whereas the fatality rate in bacteremic cases fell from 75 per cent to 27 per cent after the use of chemotherapy.

To confirm the bacteriologic diagnosis, blood cultures should be taken before the administration of sulfanilamide. Blood cultures taken after therapy has been started are likely to be negative. If so, and if the history and intra-partum experiences indicate that the patient is potentially infected, it is justifiable to employ chemotherapy prophylactically.

Sulfanilamide or one of its derivatives must not be employed without an understanding of the toxic properties and must be administered under strict supervision, so that the drug may be stopped when ill effects become obvious. Long, Bliss and Feinstone⁵ noted toxic signs in a series of 307 cases and were impressed with their relative importance. They have listed fever, jaundice, acute hemolytic anemia and agranulocytosis as sufficiently serious to abandon the use of sulfanilamide. At the Boston City Hospital we have found nausea, vomiting and leukopenia common. Cyanosis, although at first a cause for concern, was found later to be no contraindication to the continuance of the sulfanilamide. The occurrence of psychic disturbances has been annoying and severe enough to make it wise to omit the drug

or reduce its dosage. Since sulfanilamide is rapidly excreted by the kidneys, the increased ingestion of water serves to speed up the neutralization and elimination of the drug. Occasionally, when the drug has to be omitted because of its toxicity, it may be resumed after the lapse of a few days, but in smaller doses. It has been our practice to combat the possibility of acidosis by the administration of equal doses of bicarbonate of soda.

Blood observations should be made twice a week to ascertain and maintain the concentration of the drug at a level of 8 to 10 mg. per 100 cc. of blood. This is extremely important to obtain the maximum beneficial effect from the sulfanilamide and at the same time to reduce both the severity and the incidence of toxemia. To maintain a high blood concentration of sulfanilamide it is possible that fluids may have to be reduced so that the daily urinary output is brought to just above 1000 cc. To guard against the development of agranulocytic angina or acute hemolytic anemia, blood studies are made every other day, including red-cell and white-cell counts and hemoglobin determinations. Blood smears should be examined to observe the type of cells.

Although the accepted procedure is to give an initial dose of 5 gr. of sulfanilamide per 10 pounds of body weight, at the Boston City Hospital we have given no more than 40 gr. as the original dose. After that we have given 15 gr. every four hours. Thus most of the patients have received 90 gr. a day, although occasionally they have received 120 and infrequently 180. Blood-level readings should serve as the guide. This was not done routinely.

Although transfusions with the blood of an immune donor are of known and often dramatic benefit to the patient, the transfusions on the maternity wards at the Boston City Hospital were from donors who were merely found to be compatible. As such, the transfusions were used with indifferent success in some very severe cases, whereas in others the results were surprisingly effective. From 250 to 500 cc. of blood was employed at a time. One or two transfusions were usually given, but occasionally six or seven at three-day intervals.

Recently sulfapyridine has been employed on the maternity wards. In vitro sulfapyridine is said to be bacteriostatic in considerably higher dilutions than sulfanilamide. Sulfapyridine, although more rapidly absorbed than sulfanilamide, is less rapidly excreted. We administer 15 gr. every four hours until signs and symptoms subside. However, recent studies by Brown, Thornton and

Wilson⁶ have shown that sulfapyridine is more toxic than sulfanilamide. They have noted oliguria, hematuria and costovertebral pain twice as frequently with the former as with the latter. We have not observed these reactions. Nearly all their cases dealt with pulmonary infections.

In the three-year period from 1937 through 1939 9691 cases were delivered at the Boston City Hospital. There were 49 septic cases, 25 of which were delivered normally; 4 were fatal. Five cases had blood cultures positive for hemolytic streptococcus.

Sulfanilamide was employed in the form of Prontylin in 36 cases. Eleven of these cases had, in addition to sulfanilamide, transfusions of citrated whole blood; usually 500 cc. of blood was given. Five of these 11 cases showed a sharp drop in the fever within forty-eight hours.

Of the 4 fatal cases, 1 was given sulfanilamide for twelve days, that is, from the seventh to the nineteenth day post partum, with sulfapyridine for an additional two days. There was no obvious beneficial effect from the drug. However, only 40 to 80 gr. of sulfanilamide was used daily. The patient died in six weeks of subacute bacterial endocarditis. Hemolytic streptococci were recovered from the blood. The patient was delivered normally. She was not transfused. The levels of sulfanilamide concentration in the blood were not determined.

The second fatal case was delivered by low forceps. The patient developed thrombophlebitis and began running a fever on the eighth postpartum day. On the ninth day she was started on Prontylin and given 60 to 90 gr. a day for seven days. She died on the nineteenth day. The diagnosis of septicemia on the record was not confirmed by blood culture.

The third case, following a normal delivery, ran a temperature of 100 to 100.5°F. for five days, with a subsequent rise to 104. Blood cultures were reported negative. She was given Prontylin, 90 to 120 gr. a day, from the eighth to the tenth day, then 60 gr. daily until the twenty-sixth day, when she died. Nine transfusions of 400 to 450 cc. of blood were given.

The last case was a normal delivery of a premature fetus. The patient had pyelitis before delivery. There was a history of nephrectomy for stone two years previously. The temperature swung from 101 to 105.2°F. A hemolytic streptococcus was recovered from the blood. The patient was given 500 cc. of blood on the thirteenth, fourteenth and sixteenth days and Prontylin, 60 to 120 gr. a day, for ten days. She died on the seventeenth day.

SUMMARY

It is apparent that although sulfanilamide is a valuable addition to our armamentarium in the treatment of puerperal sepsis, it must not be relied on completely. Deaths from these infections continue to occur. The fact that 25 of the 49 septic cases were delivered normally shows that instrumentation per se is not so heavily responsible as is believed and that infection may arise under the simplest conditions at delivery. Transfusions, although known immune donors were not used, are supportive and should be carried out in severely septic cases. Transfusion with the blood of an immune donor has been shown to be of immense value. Despite the evidence of

all known bacteria in the urine, the patient should be continued on prophylaxis for a period of infection.

466 Commencement

1. Case 1: 1st day of infection
2. Case 2: 1st day of infection
3. Case 3: 1st day of infection
4. Case 4: 1st day of infection
5. Case 5: 1st day of infection
6. Case 6: 1st day of infection

hat appears to be the case to continue to sufficiently compensate or absence of the function of the fundus of the uterus. Five, however, had taken place. Evidence that antitoxin when stasis of

Which Specific Drug

THE TREATMENT OF URINARY-TRACT INFECTIONS BY SPECIFIC THERAPY

A Clinical Study

E. GRANVILLE CRANFELD, M.D.

BOSTON

THE treatment of urinary-tract infections has recently passed from the stage of administration of a group of comparatively harmless and, for the most part, inefficient drugs, to the use of a group of potent but potentially harmful chemicals.

The term "specific," when applied to these antiseptics, is not easily defined. It certainly does not suggest that the drugs are not suitable for treatment of other than urinary-tract infections. The implication that there is a certain drug that should be administered in, for example, colon-bacillus infections of the kidneys and bladder, to the exclusion of all others, is not in accordance with clinical facts. Perhaps we mean that specific drugs are potent. Without question some of the chemicals are potent. Some of them are able to kill bacteria that are concerned in urinary-tract infections. In this respect they approximate the use of the term specific drugs. It is also abundant examples of failure to cure urinary-tract infections even after serial administration of one, and then another, of these potent drugs. Let us then consider specific urinary-tract drugs to be more potent drugs than those to which we have been accustomed, with sharp difference.

	NO. OF CASES	NO. OF CURED CASES	NO. OF RELAPSED CASES
1	5	1	
2	5	4	
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of the urinary tract. It is

degrees of stasis in the urinary tract. It is the degree of stasis in the urinary tract that are not of sufficient importance for treatment. For the bladder, the degree of stasis in the urinary tract probably represents such smaller amounts of stasis in the urinary tract as to interfere with treatment in the pelvis and ureters.

Instant drainage offer little chance for cure so long as the drain is not sufficient. This is particularly applicable to the treatment of the bladder and its surgical treatment. The degree of the drainage does not prevent the use of sulfanilamide from taking place, but does prevent the production of sterile urine.

The treatment of the bladder and ureters involve the urinary tract. This produces abnormal drainage of the urinary channels and with the cure of urinary-

*Presented at the annual meeting of the Massachusetts Medical Society, May 22, 1940.

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ACUTE INFECTION OF THE URINARY TRACT

Acute infections of the urinary tract show a marked tendency toward involvement of the whole tract, including the prostate in men, when the extent of the involvement is determined by cystoscopic studies rather than by symptomatology. Acute infection of the kidney is pyelonephritis when fever is present.

The acutely infected patient presents not only the question of how best to render the urinary tract sterile, but also the problem of clearing pus from the kidney and of controlling the toxic effects of the infection on the patient, which are manifested in nausea, vomiting, anorexia, dehydration and, if sufficiently long continued, anemia. The severity and duration of the chronic stage of infection often depend on the management of the acute stage of the disease.

I now make use of forced fluids, by whatever means, and alkalinization of the patient's urine as the first stage of treatment. When this has been accomplished for from twelve to twenty-four hours, even though the fever continues, the patient can maintain an intake of fluid at from 3500 to 5000 cc. and can manage a supporting diet adequate to prevent the development of anemia. Antiseptics can then be administered and will be tolerated.

I prefer to use sulfanilamide drugs rather than mandelic acid in treating the acute stage of urinary infections. The preliminary treatment already advocated is aimed at the control of acidosis, and any form of acidification therapy bids for a return to that condition. Dosages of sulfanilamide need not be so large as those commonly given for some other diseases. Forty grains a day, in divided doses over a period of six to seven days, is usually adequate. The blood level produced by sulfanilamide may reach only 2.5 to 6.0 mg. per 100 cc. Sixty grains daily has been required for a few cases. The change to higher dosage will be indicated by the third or fourth day, if it is noted that adequate progress is not being made. On the whole, a patient who is being benefited by the drug will demonstrate a fair degree of improvement by the third or fourth day of treatment. If some signs of clearing of the urine are not apparent, or if it appears to clear and then clouds again during treatment, sterilization of the urine probably cannot be accomplished at this time. Return of temperature to normal will have been accomplished in most cases even though a clearing of the urine has not been obtained. If the patient is alkalinized before therapy is begun, cases of intolerance to the drug will be less common. The prostatitis that frequently accompanies

urinary-tract infection is less likely than the urinary-tract infection to be cured by sulfanilamide therapy, and may persist and give rise to recurrent infection at some remote period. One will do well to test for prostatitis by massage at the end of treatment of an acute infection in men.

There is always the possibility that there is some form of obstructive lesion in the urinary channels in any case of acute infection. The presence of such a lesion cannot be determined cystoscopically with safety in these cases, since cystoscopy often causes severe damage when done in the course of an acute condition. It is safest in pregnancy and exacerbations of chronic conditions. The history will usually give sufficient indication of a chronic condition, and intravenous pyelography will usually detect an acute obstruction, such as a stone, since sufficient function usually remains in the kidneys, in spite of the pyelonephritis, to secrete the dye.

SUBACUTE AND CHRONIC INFECTIONS OF THE URINARY TRACT

Subacute and chronic infections offer a wider choice of antiseptic drugs than the acute infections do. They also allow time for adequate diagnosis of the condition of the patient, the presence or absence of gross pathologic conditions, and the estimation of the function of the kidneys, both together and as individual organs. It is in this group of infected cases that renal deficiencies are common and gross pathologic conditions, which are often the result of the infections, are encountered. Total renal function is often low, and uremia may be present.

There is a place for mild antiseptic medicines in subacute cases. I make use of hexamethylenamine, without reduction in intake of fluids, for immediate postoperative treatment of residual infection. Doses of $7\frac{1}{2}$ gr. four times daily will prove adequate for clearing many of these infections. It can be safely administered to ambulatory patients. The drug should be confined almost entirely to the treatment of the common infections due to the gram-negative bacilli and acts best at pH 5.3 or below. Increased irritability of the bladder and blood in the urine are the only contraindications to its continued use. These signs and symptoms usually quickly disappear on withdrawal of the medication.

Mandelic acid is also applicable for the treatment of ambulatory patients who have chronic infections. And it is useful for treating some patients who do not tolerate sulfanilamide, although I consider the drug on the whole less effective as an antiseptic, both because of its limited range

in the bacterial field and because it requires a strong acidifier.

Routine administration of a fixed amount of acidifier with mandelic acid is undesirable. Some patients do not need any acidifier at all; some may need it at the beginning of the treatment and then either part or all of it may be withdrawn. Routine use of the acidifier, when the urine is already strongly acid, only hastens signs of renal irritation in some cases, and forces discontinuance of the treatment, which might have been carried to completion under less acidification. Attention to the acidifier by daily pH determinations is the most satisfactory method of administering the drug. Some urines cannot be acidified, because of the urea-splitting bacteria that they contain, no matter how much acidifier is administered. It must be remembered that only the urine is alkaline, and that serious degrees of acidosis may result if the acidifier is pushed in cases that continue to exhibit alkaline urine. When dangerous degrees of acidosis are so produced, the intravenous administration of a 2 per cent solution of sodium bicarbonate is indicated. About forty-eight hours after beginning mandelic acid therapy a fairly stable, low pH is established and remains almost constant, without the usual alkaline flood at mealtime or the other fluctuations noticeable in a normal person.

The sulfanilamide drugs are my choice of treatment for most of the long-standing infections. This is particularly true when the patients can be hospitalized. They are very effectively used during the latter portion of a patient's convalescence in the hospital, when chronic infections are treated after removal of stone or after correction of renal lesions. The amount of drug required is similar to the dosage for acute infections. The staphylococci yield to sulfathiazole more readily than to other drugs of this group, although as yet experience with it has not been so extensive as with sulfanilamide.

UNJUSTIFIABLE USES OF SPECIFIC URINARY-TRACT ANTISEPTICS

Sufficient experience with specific urinary-tract antiseptics has been accumulated to make possible the enumeration of a considerable group of conditions in which their use can be expected to fail to produce a cure. It is proper to call attention to these cases because it is apparent that extensive courses of treatment are often given, with loss of time, considerable expense and no benefit. Table 1 lists 50 consecutive cases in which much unprofitable treatment was given. These cases all exhibited urinary-tract infection. The primary conditions that underlay the infection are

given. These cases emphasize what appears to be a fact; namely, it is seldom wise to continue to treat chronic infections without sufficiently complete diagnosis to indicate the presence or absence of gross disease, and something of the function of the kidneys. It is to be noted that 21 cases were presumably cured after diagnosis and remedial measures had been employed. Five, however, recurred after apparent cure had taken place.

One can state with some confidence that antiseptics can be expected to fail when stasis of

TABLE 1. *Diagnosis in 50 Cases in Which Specific Drug Therapy Failed.*

Diagnosis	No. OF CASES	No OF CURED CASES	No OF RECURRENT CASES
Chronic pyelonephritis	5	1	
Prostatic obstruction (residuals 5 to 53 ounces)	5	2	
Renal abnormalities	5	4	
Infection due to staphylococci, <i>Proteus vulgaris</i> or <i>Pseudomonas aeruginosa</i> (<i>Deakii</i> pyocyanus)	3		
Prostatitis with urinary infection	3		
Bladder tumor	3	2	
Debility	4	3	1
Diverticulosis of sigmoid	2		2
Contracted kidneys	2	1	
Renal calculus	2	2	
Post partum pyelonephritis	2	1	1
Hypertension, with inability to concentrate urine	3	1	
Gonococcal prostatitis	1		
Gonococcal prostatic abscess	1		
Abscess of Bartholin's gland	1	1	
Tuberculous perforation of bladder	1		
Old polyomelitis, with bladder residual	1		
Cystocele	1	1	
Carcinoma of sigmoid, hydronephrosis	1	1	
Nonfunctioning kidney	1		
Cyst of broad ligament, hydronephrosis	1		1
Multiple abscesses of kidney	1	1	
Stricture of urethra, with diverticulum	1		
Totals	50	21	5

urine exists anywhere in the urinary tract. It is recognized that small degrees of stasis in the ureters, pelves or bladder are not of sufficient importance to negate treatment. For the bladder, a residual urine of 3 ounces probably represents the upper limit. Much smaller amounts of stagnant urine are effective in interfering with treatment when they occur in the pelves and ureters.

Cases on constant drainage offer little chance for sterilizing the urine so long as the drain is kept in place. This is particularly applicable to prostatic hypertrophy and its surgical treatment. The presence of the drainage does not prevent the tissue effect of sulfanilamide from taking place, as evidenced by subsidence of temperature, but does prevent the production of sterile urine.

Stones, large tumors of the bladder and extrinsic conditions that either involve the urinary organs or by encroachment produce abnormal physiologic behavior of the urinary channels are almost certain to interfere with the cure of urinary-tract infections.

Antiseptics cannot be expected to reach closed pus or partially obstructed pus-containing organs in sufficient concentration to clear infection. This group should include abscesses, pyonephrosis, infections of Skene's or Bartholin's gland, prostatitis and perinephritis. Since urinary-tract infections are common in prostatitis and accessory lymph-node infections, recurrence of the urinary-tract infection is, in a large measure, dependent on the cure of the lymph-node infection.

Total renal deficiency, as differentiated from unilateral renal deficiency, offers explanation of the failure to obtain satisfactory results from antiseptics in some cases through inability to produce a therapeutic concentration of the drug in the efferent channels. This group should include some hypertensive and nephritic cases in which there is fixation of specific gravity of the urine. There is also the danger of storage of these potentially harmful drugs. It is almost unbelievable that in most publications on the use of the mandelic acid and sulfanilamide groups of drugs, there is so free an assumption of the normalness of the kidney function when it is so well recognized that infection in chronic form is one of the commonest causes of renal deficiency.

Renal counterbalance will account for a certain proportion of failures in the treatment of infections. In severe degrees of either acute or chronic infections of one kidney, there is a tendency for the drug to escape so completely through the uninfected functioning kidney that an effective concentration of the drug in the affected kidney is not obtained. Such conditions, if chronic, usually call for surgery.

Special types of bacteria are responsible for the failure of cure in some cases. So wide a variation of results is obtained, and they are so unpredictable, that I am inclined to attempt to clear the infection by use of the sulfanilamide group of drugs. I am willing to accept failure and to try other antiseptics.

There are beginning to appear a few cases of rapid rise in nonprotein nitrogen from the normal reading, which preceded administration of the sulfanilamide group of drugs, to dangerous levels. This rise seems to subside promptly on discontinuance of medication. I have personally noted that in three of four cases of pregnancy injury from combined pre-eclampsia and pyelonephritis, when treated for infection some years after delivery, showed nonprotein nitrogen readings as high as 58 mg. per 100 cc. within three or four days after institution of therapy in doses of 40 to 60 gr. daily.

RECURRENCES

In a small group of cases, after cure of infection has been produced and confirmed, there is remote recurrence of infection at periods as long as several months or even years. In 19 of 22 such cases, the bacteria were approximately the same as those in the preceding infections. In one case, there was tonsillitis, for which the surgeon justly did not wish to remove the tonsils. In another, there were unrest and chronic exhaustion. One infection was apt to recur at the time of catamenia, and did so on several occasions many months apart. In two cases, there was diverticulosis of the sigmoid. It seems fair to assume that these cases of frequent remote reinfection are the result of failure to discover and to remedy the causal factors of the original infection. The frequency of occurrence of remote infections in the same cases is too great to justify the assumption that they are accidental occurrences.

SPECIAL GROUPS OF INFECTION

There is sufficient evidence of variation from the average in the clinical findings in some cases to warrant giving them special consideration in treatment by urinary antiseptics.

Cases of prostatic obstruction are so frequently deficient in renal function, and retention of nitrogen is so common, that it is not advisable to treat recent postoperative patients for urinary infection without determination of their renal status. It is in this group of patients that I have seen the most serious results from storage of drugs when an attempt has been made to clear their infections before time had been allowed for improvement of renal function after relief of obstruction.

Prostatitis represents a semiclosed infection. It is often associated with urinary-tract infection. Under treatment by antiseptics the urine is more readily cleared of infection than is the prostate. It is recognized that urinary antiseptics may appear in the prostatic secretions, and therefore that the cure of the prostatitis is theoretically possible. Practically, the results of treatment are not good. The possibility of cure in these patients is improved if they are given a period of massage previous to therapy. Since sulfathiazole is quite effective in staphylococcal infections and since many chronic prostatic infections are of that nature, it is to be hoped that this drug will improve results. Marked improvement has been demonstrated in a limited group of cases.

The ureteral and pelvic dilatations of pregnancy create special conditions for harboring urinary-

tract infections. These infections have long baffled therapeutic measures and antiseptics. The use of cystoscopic therapy has had its chief favorable results here and has had wide application. Mandelic acid therapy is not satisfactory in these cases, because acidosis is already marked in the acute stage of the pyelonephritis of pregnancy. Sulfanilamide has proved of particular effectiveness in these cases, to the extent that cystoscopic therapy has seldom been used at the Boston Lying-in Hospital during the last two years. Diagnostic measures, both by intravenous methods and by cystoscopy, have increased. In the majority of these cases, the renal cortex has sufficient function for producing therapeutic concentrations of the drug for antiseptics, in spite of pyelonephritis and large atonic dilatations of the pelvis and ureter. The function is lowest in severe degrees of pyelonephritis. Storage of the drug may be very rapid and of serious consequence if such a condition is bilateral and the patient shows nitrogen retention. One now obtains cure of the infection in approximately 40 per cent of the cases. Traut, Bayer and McLane* claim cures in 55 per cent of their cases.

The routine treatment is to alkalinize the patients and to raise their fluid intake to 3500 or 4500 cc. daily. Sulfanilamide is administered in doses of 40 to 60 gr. daily, without attempting to concentrate the urine, and being careful to maintain alkalinization. The treatment is for a period of seven days. Three types of results are produced. In 40 per cent, there is cure of the infection. However, since stasis is the important etiologic factor in the infections of pregnancy, there are a number of cases in which reinfection occurs one or more times during the remainder of the pregnancy. A second group of cases shows diminution and usually cessation of symptoms, but the urine remains cloudy. Another group shows loss of pus, but the infection remains as a bacilluria. It is important to recognize the futility of treating gross pathologic conditions in these cases, except for symptomatic relief. Doses of 60 gr. of sulfanilamide a day are usually preferable to smaller ones. Few cases show improvement if the administration of sulfanilamide is continued beyond a week.

Recent surveys of cases of pyelonephritis of pregnancy indicate that there is almost as much likelihood that mild infections in pregnancy will evidence as much renal damage some years after the injury as severe cases. It is incumbent on those in charge of such patients to treat the women

who have bacilluria and mild infections but who may have no symptoms as actively as they do the febrile cases. Sufficient observation should be given to all post-partum cases for three to four months following delivery to determine whether the infection has cleared. In those cases in which there is delayed retrogression of the dilatations of the pelvis and ureters, reinfection may occur at any time. If it takes place after demonstration of absence of infection, one may rest in a sense of false security. In some of these apparently cured patients, review of the cases after several years may demonstrate extensive damage to the pelvis and ureters, and persistence of the infection.

SUMMARY

Clinical experience with the more recent additions to the list of urinary antiseptics indicates their increased potency, both for good and harm, over older antiseptics. There is some specificity worthy of the name in these drugs, but it is only relative. There are conditions of renal disease and disordered function in the urinary tract in which cure often cannot be produced by any of the antiseptics. Cure can be accomplished in a considerable number of such cases when, after adequate diagnosis of pathologic and physiologic conditions of the urinary tract, proper remedial measures have been applied or advantage of this information has been taken for better administration of the antiseptic.

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DISCUSSION

DR. GEORGE GILBERT SMITH, BOSTON: With the views expressed by Dr. Crabtree I am in almost complete agreement. He has done well to emphasize two points: the necessity for thorough study of the patient before subjecting him to treatment, and the danger that attends the unwise use of these newer urinary antiseptics. In the early days of sulfanilamide therapy it was reported to be the custom in a hospital remote from here to treat all admissions with sulfanilamide. If they showed no improvement after a few days, a history was taken and a physical examination was made. This may have been a slight exaggeration, but was probably not far from the truth in a good many cases.

The calamities resulting from the unguarded use of sulfanilamide have probably been more numerous than we shall ever know. The chief danger is that of causing agranulocytosis; this may be guarded against by doing a white-cell count at least twice a week. Sudden, fulminating destruction of red blood cells has been reported, but is probably much less frequent than agranulocytosis. The appearance of the patient and determining of the hemoglobin percentage will warn the physician of the development of anemia.

A peculiarity of sulfanilamide that has made its use in a sense disappointing is the temporary nature of the improvement brought about by its administration. This condition exists in gonococcal infections as well as in those of

*Traut, H. F., Bayer, D. S. and McLane, G. M. The prophylaxis of pyelo-urethritis gravidarum. *I. A. M. A.* 115:94-97, 1940.

the upper urinary tract. The sudden clearing of the urine or the disappearance of urethral discharge raises false hopes in the minds of both physician and patient. Experience has taught us to discount this apparent improvement; the drug must be continued for several weeks at least, although the dosage may be decreased to 15 or 20 gr. a day. I have a patient who a year ago was almost incapacitated by recurring attacks of pyelonephritis. He has been taking this amount of sulfanilamide for over a year. To all appearances he is well, but his urine still shows a positive culture for colon bacilli.

It has seemed to me that mandelic acid, if it can be tolerated by the patient, gives more permanent results in removing colon bacilli from the urinary tract than does sulfanilamide. The necessity for concentrating the urine

and for keeping it at a pH of 5.3, as Dr. Crabtree has pointed out, makes the administration of mandelic acid somewhat more arduous.

In our enthusiasm for these potent urinary antiseptics we are likely to forget some of the less spectacular but nevertheless useful chemicals. Methenamine, as Dr. Crabtree has said, has cleared up many colon bacillus infections in the past. Serenium has proved very satisfactory in a number of patients, and can be given without fear of complications. With the rapid development of new derivatives of sulfanilamide, we find ourselves somewhat bewildered by the claims of their originators. The wisest course is to stick to the preparation that we have learned to use until others have been definitely proved to be better.

TREATMENT OF MENINGOCOCCAL MENINGITIS*

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SINCE Flexner¹ in 1908 first reported his series of cases of meningococcal meningitis treated with antimeningococcus serum, there has been a general acceptance of the influence of serum treatment in this disease. Table 1 gives the comparative results in the earlier years, with a reduction in mortality of nearly 40 per cent in the serum-treated cases.

In the Boston epidemic of 1904-1907 the mortality in 181 cases treated at the Boston City Hospital was 67.3 per cent. In the succeeding eight years the mortality in 50 endemic cases was 58 per cent. The

treated cases was 54 per cent, and in 102 untreated it was 82 per cent.

The reduction in mortality, however, since the introduction of antiserum treatment has been far from satisfactory. In Massachusetts, from 1926 to 1938, in 1474 cases the mortality was 42 per cent, varying in yearly levels from 30 to 66 per cent.⁵ In Chicago, from 1916 to 1935, the mortality was 47.7 per cent in 4028 cases (Hoyne⁶); in Detroit, from 1928 to 1931, it was 50.5 per cent in 1686 cases⁶; and in New Orleans, from 1925 to 1934, it was 65 per cent in 221 cases (Tripoli⁷).

The relatively unsatisfactory effects of serum treatment may be due to several causes. In the first place, the serum may not contain an effective level of antibodies for the type of meningococcus causing the infection. The polyvalent serums usually used in this country are produced by the injection into horses of a number of strains, often twelve or more, but the antibody response to each strain may be strikingly different. Furthermore, there is no satisfactory measure of the therapeutic value of antimeningococcus serum except the clinical effect. Wright et al.⁸ failed to find that determination of the level of agglutinins was of value in measuring the clinical effectiveness of antiserum. Miller's⁹ method of raising the virulence of meningococci with mucin so that they are pathogenic for mice has introduced the possibility of using mouse-protection tests as a measure of potency, but the clinical value of this technic has not been determined. Secondly, the serum may not reach the organisms throughout the subarachnoid space. Meningococci may be walled off in islands of fibrin, and recurrences and relapses occur in about 5 per cent of the cases after apparent clear-

TABLE 1. *Early Results of Serum Treatment.*²

AUTHORITY	NO OF CASES	MORTALITY	
		SERUM TREATED CASES	CONTROL CASES
		%	%
Flexner and Jobling	1300	31	70
Netter ..	100	28	49
Robb .	300	30	72
Dopier	402	16	65
Levy	165	18	52
Steiner	2280	37	77

natural course of this form of meningeal infection is much better than that due to infections with other bacteria but has shown great variation, with mortalities ranging from 40 to 90 per cent. In an epidemic in South China Olitsky³ reported a mortality of 84.6 per cent in 104 cases without treatment and of 54.1 per cent in 346 cases with lumbar puncture only. Cormack⁴ recently reported an epidemic in Africa in which, due to lack of serum, only a part of the cases were treated; the mortality in 139

*Presented at the annual meeting of the Massachusetts Medical Society, Boston, May 22, 1940.

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ing. The intravenous route has generally been considered unsuited for an antiserum because of the supposed blood-brain barrier (Stern et al.,¹⁰ Mutermilch and Salamon,¹¹ and Freund¹²). Friedemann et al.¹³ have recently shown, however, by ingenious experiments that the blood-brain barrier does not exist for antitoxins, and Hoyne⁶ has secured very low mortality rates by intravenous administration alone. Table 2 shows the comparative

TABLE 2 *Comparative Results of Serum Treatment by Different Routes.*

AUTHORITY	NO OF CASES	MORTALITY %
SCLERACHINOID		
Flexner and Jobling ¹	393	25
Bolduan ¹⁴	143	26
Appelbaum ¹⁵	302	18
Smith Maxson and Murphy ¹⁶	56	41
Total	894	24
INTRAVENOUS AND SCLERACHINOID		
Hoyne ⁶	201	27
Banks ¹⁷	38	16
Smith Maxson and Murphy ¹⁶	75	36
Bolduan ¹⁴	48	21
Tillett and Brown ¹⁸	19	5
Total	381	26
INTRAVENOUS		
Hoyne ⁶	96	16

results of serum treatment by different routes Hoyne, in 43 cases under twenty years of age treated intravenously, reported a record mortality of 23 per cent.

There is great difficulty in evaluating results because of variation in virulence and type of the organisms, the use of different amounts of serum of varying antibody titers and the difference in the patients' ages and in the time of treatment. The

TABLE 3 *Effect of Time of Treatment, According to Age.*

AGE	MORTALITY		
	TREATED BEFORE 4TH DAY	TREATED 4TH TO 7TH DAY	TREATED 7TH DAY OR LATER
	%	%	%
Less than 2	0	20	58
2-5	12	19	24
5-10	9	16	17
10-20	12	23	37
20 or over	30	32	28

mortality below one year of age and above forty years is very high, and that above fifty years approximates 100 per cent. Flexner¹ showed the importance of early treatment, which was especially marked during infancy (Table 3).

The value of Ferry's¹⁹ antitoxin as compared to an antiserum still remains uncertain. In 1936 Hoyne⁶ reported 201 antitoxin-treated cases, with a mortality of 27 per cent. He gives large doses intravenously—50,000 to 100,000 units (150 to 300 cc). Banks²⁰ had a mortality of 28 per cent in 25 cases treated with antitoxin. A number of reports of antitoxin

treatment of meningitis, usually of small numbers of patients, have shown good results, but due either to lack of controls or to obvious differences in age or time of treatment in the groups the figures are not dependable. Ferry's antitoxin contains antibacterial antibodies, and Zinsser²¹ believed that "the therapeutic activity of so-called meningococcus antitoxin is due to the presence of antibacterial and antienterotoxin antibodies."

For intraspinal use, the dose naturally is limited, and variation of dosage must be secured by injection at different intervals. Bolduan¹⁴ at Bellevue Hospital showed much better results with twelve-hour (7 per cent mortality) than with twenty-four-hour (23 per cent mortality) intervals.

TABLE 4 *Effect of Sulfanilamide Therapy.*

AUTHORITY	No OF CASES	MORTALITY	
		%	
Waghenstein ²²	72	15	
Carey ²³	5	0	
Banks ²⁰	16	6	
Eldridge ²⁴	12	25	
" " " "	5	0	
" " " "	6	0	
" " " "	271	11	
" " " "	25	12	
Total	412	11	

In the recent Boston epidemic the mortality was 48 per cent, with eight-hour to twelve-hour intervals.

Some workers believe that overtreatment may do harm. In judging the discontinuance of serum therapy, a drop in the number of cells and in the amount of cerebrospinal fluid, disappearance of the organism in culture and clinical improvement must all be considered. Since serum reactions may keep up the pleocytosis and an increase in the amount of cerebrospinal fluid, the chief dependence must be on smears and cultures.

During the last three years, sulfanilamide has been used with a generally lower mortality than that secured with serum (Table 4).

Branham and Rosenthal²⁵ have shown experi-

TABLE 5 *Effect of Combined Serum and Sulfanilamide Therapy.*

AUTHORITY	No OF CASES	MORTALITY	
		%	
Banks ¹⁷	59	12	
Smith Maxson and Murphy ¹⁶	16	13	
Moraz Charle and Queguiner ⁷	23	9	
Total	98	11	

mentally in mice that serum and sulfanilamide together were more effective than sulfanilamide alone in four of ten strains. Similar results were obtained by Brown.²⁶ Clinically no clear evidence has been secured that serum is usually necessary

when sulfanilamide is used. But since occasional cases may not respond to the drug treatment, it may be desirable to use serum, although probably only small amounts will be needed. Table 5 shows the results of combined serum and sulfanilamide therapy; the average mortality rate is the same as that for sulfanilamide alone.

One of the most striking effects of sulfanilamide treatment is the rapid subsidence of symptoms and the spinal-fluid pleocytosis, and the rapid disappearance of the organisms from the blood and spinal fluid, usually in twenty-four hours. Blackfan² found in 33 cases treated with anti-meningococcus serum that organisms could be recovered after the third day in 51 per cent, and Levy³¹ in 144 cases recovered meningococci after the third day in 24 per cent. In the 25 cases treated by us with sulfanilamide no organisms could be recovered after the third day, except in one case.

Relapses after serum treatment were reported by Flexner¹ in 4.5 per cent of 427 cases, and Worster-Drought and Kennedy³² reported relapses in 5 per cent. Tillett and Brown¹⁸ in the Baltimore epidemic, in which they used a very effective serum, still had recrudescences or relapses in 11.5 per cent. Relapses and recurrences after sulfanilamide have been reported in only 0.5 per cent,^{20, 22-28} and these have occurred without exception with inadequate treatment. The drug should promptly reach a level in the spinal fluid of 5 to 10 mg. per 100 cc., although lower concentrations are often effective.

Oral administration is entirely satisfactory; if vomiting is present, the drug may be given subcutaneously in 0.8 per cent solution or intrathecally.

Untoward effects of the drug must be continually watched for. These are too well known to require review. In our series they were rarely significant. The use of sulfanilamide alone has given an opportunity to judge the harmful effects of intrathecal serum, as distinguished from local effects of the disease itself. Although our experience has been too small for satisfactory analysis, we were struck by the decrease in spinal-fluid block and in myelitic and cerebral damage and by the absence of pressure abnormalities in the sulfanilamide-treated cases. The same effect has been noted by Hoyne⁶ following intravenous serum therapy as contrasted with intrathecal treatment.

Meningococcemia has disappeared promptly following sulfanilamide treatment, even in cases found resistant to serum therapy.

Meningococcal arthritis usually tends to subside, even without efficient therapy. Tillett and Brown¹⁸ found arthritis in 43 per cent of their cases. All cleared, though some slowly, with intravenous and intrathecal therapy. Sufficient evidence of

control of arthritis by chemotherapy is still lacking, but our cases have shown rapid subsidence. Schein²³ in a recent report of 23 cases of meningococcal arthritis discredits somewhat the optimistic prognostic view so generally held. Several of his cases had persistent trouble and in 3, or 13 per cent, there was permanent joint damage, with destruction and ankylosis. In 2 cases of severe purulent meningococcal arthritis we have followed the technic, so successfully used in streptococcal arthritis, of mechanically washing out the joint, with prompt and complete recovery.

The dosage of sulfanilamide recommended by Long and Bliss³⁴ seems adequate:

WEIGHT OF PATIENT	INITIAL DOSE	SUBSEQUENT 4-Hr. DOSE
<i>lb.</i>	<i>gr.</i>	<i>gr.</i>
100 or more	50-80	15
50-90	30-50	10-15
25-50	20-30	5-10

The advantages of sulfanilamide are that administration is simple; it is independent (largely) of type of organism; the dosage can be reasonably accurate, and the concentration is measurable; inadequacy of original titer or loss from keeping, as in serum, is excluded; the drug is much cheaper; the mortality is lower; there is apparently less neurologic damage.

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REFERENCES

- Flexner, S. and Jobling, J. W. Serum treatment of epidemic cerebro-spinal meningitis. *J. Exper. Med.* 10:141-203, 1908. An analysis of four hundred cases of epidemic meningitis treated with the anti-meningitis serum. *Ibid.* 10:690-733, 1908.
- Blackfan, K. D. Treatment of meningococcus meningitis. *Medicine* 1:139-212, 1922.
- Olitsky, P. K. Experiences with a recent epidemic of meningococcal meningitis among a Chinese civil population. *Arch. Int. Med.* 23:380-394, 1919.
- Cormack, R. P. On value of serum-treatment of cerebro-spinal fever. *East African M. J.* 12:311, 1936.
- Annual Reports (1926-1938). Department of Public Health, Commonwealth of Massachusetts.
- Hoyne, A. L. Intravenous treatment of meningococcal meningitis with meningococcus antitoxin. *J. A. M. A.* 107:478-481, 1936.
- Tripoli, C. J. Bacterial meningitis comparative study of various therapeutic measures. *J. A. M. A.* 106:171-177, 1936.
- Wright, I. S., De Sanctis, A. G. and Shepler, A. E. Determination of value of serum in treatment for meningococcus meningitis report of illustrative series of cases. *Am. J. Dis. Child.* 38:730-740, 1929.
- Miller, C. P. Study of experimental meningococcal infection. *Proc. Soc. Exper. Biol. & Med.* 32:1136-1142, 1935.
- Stern, L., Kassel, G. N., Lokschina, E. S., Romel, E. I. and Zeitlin, S. M. A propos du passage des anticorps du sang dans le liquide céphalo-rachidien. *Compt. rend. Soc. de biol.* 99:360-362, 1928.
- Mutermilch, S. and Salamon, E. Sur l'immunité méningée passive et active. *Compt. rend. Soc. de biol.* 108:696-699, 1931.
- Freund, J. Accumulation of antibodies in central nervous system. *J. Exper. Med.* 51:889-902, 1930.
- Friedemann, U., Zuger, B. and Hollander, A. Quantitative studies on neutralization of pathogenic agents in tissues (circulating antibodies-permeability of cerebral capillaries to antibodies). *J. Immunol.* 36:219-230, 1939.
- Bolduan, N. W. Treatment of meningococcus meningitis intraspinal use of antimeningococcus serum at Bellevue Hospital, 1928 to 1936. *J. Pediat.* 13:357-363, 1938.
- Appelbaum, E. Immunological aspects and treatment of meningitis. *Arch. Pediat.* 55:400-416, 1938.
- Smith, T. C., Maxson, W. T. and Murphey, D. F. H. Meningococcus meningitis observations in one hundred and fifty-seven cases in Louisville City Hospital. *South. M. J.* 31:1168-1171, 1938.
- Banks, H. S. Serum and sulphamylamide in acute meningococcal meningitis preliminary survey based on one hundred and thirteen cases. *Lancet* 2:7-13, 1938.
- Tillett, W. S. and Brown, T. McP. Epidemic meningococcus meningitis an analysis of twenty-six cases, twenty one of which occurred in the spring of 1935. *Bull. Johns Hopkins Hosp.* 57:297-316, 1935.

- 19 Ferry N S Meningococcus antitoxin prophylactic and therapeutic tests on guinea pigs *J Immunol* 23 315-324 1932 Meningococcus toxin and antitoxin further tests on monkeys *Ibid* 26 133-141 1934
- 20 Banks H S Note on Ferry's meningococcus antitoxin in treatment of acute cerebro-spinal fever *Lancet* 1 855-858 1935
- 21 Zinsser H Enders J F and Fothergill L D *Immunity Principles and application in medicine and public health* Fifth edition of *Resistance to Infectious Diseases* 801 pp New York Macmillan Co, 1939
- 22 Waghelein J M Sulfanilamide in treatment of 106 patients with meningococcal infection *J A M A* 111:1272-1274 1938
- 23 Carey B W Jr Use of para-aminobenzenesulfonamide and its derivatives in treatment of infections due to *S. Streptococcus hemolyticus* meningococcus and gonococcus report of thirty-eight cases *J Pediatr* 11 702-711 1937
- 24 Eldahl A Intrathecal sulphanilamide in meningococcal meningitis *Lancet* 1 712-715 1938
- 25 Willen L J Sulfanilamide therapy in meningococcal meningitis *J A M A* 110 630-632 1938
- 26 Jewsbury E C O Use of sulphanilamide in treatment of meningococcal meningitis *Lancet* 1 1262-1264 1938
- 27 Moraz G Charle H and Queguiner A Essais compares de traitements (sérum corps azo que sulfanilamide) de la meningite cerebro-spinale dans des régions coloniales rurales (Niger français) *Presse med* 46 1113-1116 1938
- 28 Place E H Sulfanilamide in meningococcal infections *M Clin North America* 23 1159-1172 1939
- 29 Branham S E and Rosenthal S M Studies in chemotherapy sulphanilamide serum and combined drug and serum therapy in experimental meningococcus and pneumococcus infections in mice *Pub Health Rep* 52 685-695 1937
- 30 Brown T M Protective action of sulfanilamide and antimeningococcus serum on menogococcus infection of mice *Bull Johns Hopkins Hosp* 61 272-279 1937
- 31 Levy cited by Blackfan²
- 32 Worster Drought C and Kennedy A M Cerebro-spinal fever the mode of invasion by the meningococcus *Lancet* 2 711-714 1917
- 33 Schein A J Articular manifestations of meningococcal infections *Arch Int Med* 62 963-978 1938
- 34 Long P J and Bliss E A *The Clinical and Experimental Use of Sulfanilamide Sulfapyridine and Allied Compounds* 319 pp New York The Macmillan Co 1939

SKIN MANIFESTATIONS DUE TO SULFANILAMIDE AND ITS DERIVATIVES*

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IT is possible roughly to classify the effects on the skin of the therapeutic use of sulfanilamide and its derivatives under the three categories suggested by Loewy¹ in a discussion of the effects of prolonged administration of drugs. These are the direct toxic effects due to overdose and cumulation, the purely allergic effects, producing manifestations identical with those seen in consequence of antigen antibody reactions in protein anaphylaxis, and the allergototoxic effects. In the first category an overdose can usually be excluded and a peculiar sensitivity due to gradual sensitization is evident. The manifestations are different from the purely allergic, anaphylactic reactions, and are fairly characteristic for the cumulative drug, which probably acts indirectly on the protein metabolism. Such an allergotoxic effect is responsible for most drug idiosyncrasies.

The accuracy of such a classification is debatable, and in the use of sulfanilamide particularly, the accompanying rashes are so multiform that hard and fast categories cannot be adhered to, so far as objective appearance of the eruption is concerned. There is no single rash characteristic of sulfanilamide and its derivatives.

Without seeming to be too definite, one may say that in many cases the first manifestations of the toxic type of eruption are shown by a faint, finely papular rash on the arms—perhaps accompanied by mild itching and fever. If the drug is continued, the rash spreads and becomes maculopapular, scarlatiniform or morbilliform. It may involve the whole body or may be limited to various parts. There is no lymphadenitis accompanying it. On cessation of the drug, the fever goes

and with it the rash, occasionally leaving the involved surfaces desquamating—at other times leaving no trace. In certain cases the rash disappears even though the drug is continued. In others, after cessation of sulfanilamide and the disappearance of the rash, the drug may be resumed in moderate dosage without untoward symptoms. Such cases may be considered to be due to direct toxicity of the drug, either from primary overdose for the patient or from accumulation. There is no allergy and no gradually built-up sensitization.

Cases illustrative of the second type, the purely allergic effect, show early in the course of administration of sulfanilamide intense itching, sneezing, lachrymation and dyspnea, with edema of the lips, eyelids and face. The eruption may be urticarial, hemorrhagic or bullous. Patch and scratch tests may be positive for the drug.

Cases showing the allergotoxic effect, that of gradual sensitization, ordinarily appear later in the course of therapy—from the seventh to the fourteenth day of average dosage of sulfanilamide. The eruption is generally maculopapular and accompanied with pruritus and urticarial lesions, with fever and, in some cases, leukocytosis. Resumption of sulfanilamide, after cessation and the disappearance of the rash, is quite certain to bring on a recurrence of the reaction.

All reports and observation show the multiform character of sulfanilamide rashes. They may be erythematous, papular, morbilliform, scarlatiniform, urticarial, petechial or bullous; the mucous membranes may be affected; the rash may be limited or general, accompanied or unaccompanied by fever and itching. Exfoliative dermatitis has been a sequel in some cases. One case has been

*Presented at the annual meeting of the Massachusetts Medical Society Boston May 22 1940

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reported in which a fixed eruption was produced by sulfanilamide and sulfapyridine.² Most cases, however, are maculopapular, not generalized, and are accompanied by fever and pruritus. Although there is no specific characteristic for the rash, numerous reports and my own observations stress its peculiar, almost maroon color in many cases, and this very intensity of the superficial vascular reaction in a fully developed case constitutes an identifying factor.

In spite of this lack of specificity of the lesions, it is not difficult to make the correct diagnosis of the eruption appearing in the course of treatment, and the only difficulty is to distinguish the morbilliform type from measles and the scarlatiniform type from scarlet fever. It has been noted that the average interval between beginning administration of the drug and the appearance of the rash falls within the period of incubation of the common infectious fevers.³ With a morbilliform sulfanilamide rash, however, Koplik's spots, catarrhal symptoms and lymphadenitis are not present, and in a scarlatiniform rash the characteristic tongue and throat of scarlet fever are absent.

There is some evidence to show that persons sensitive to local anesthetics and those who have had other drug rashes are likelier to be sensitive to sulfanilamide.

The eruption is likely to occur in from 2 to 6 per cent of cases treated with average dosage, with a higher incidence, 30 per cent, in cases intensively treated.⁴ It has been shown that sulfanilamide in certain concentration and in certain persons is a photosensitizing agent and that in such patients the rash is confined to exposed surfaces, or is more intense over such areas.^{5, 6} Although not all cases of sulfanilamide eruption can be considered to be dependent on exposure to sunlight, it is definitely advisable that all patients under sulfanilamide therapy be protected from direct sunlight or ultraviolet radiation.

It has been found that in certain cases of sulfanilamide dermatitis there is an increase in urinary porphyrins.^{7, 8} Such increases, however, may occur in association with various disorders accompanied by severe derangement of the general metabolism, and increased values are not found in all cases of sulfanilamide dermatitis. Long and Bliss⁹ state that in their opinion the role played by the production of porphyrins in sulfanilamide dermatitis has not been investigated sufficiently to warrant a final word on the subject. Brunsting⁸ says that whereas light sensitization and porphyria may appear at the same time there is no evidence to show that one condition is dependent on the other.

In the use of sulfathiazole apparently a some-

what higher incidence of skin reactions is to be expected. Haviland and Long¹⁰ report 12.8 per cent of eruption and state that the rashes fall in three groups—maculopapular, urticarial and those like erythema nodosum. This last group has not been reported in connection with sulfanilamide or sulfapyridine medication. They also report a new type of reaction with this drug—a conjunctival and scleral injection restricted mainly to the exposed portion of the bulbar conjunctiva and sclera, and in some cases apparently dependent on exposure to light. I have seen one such case, in which there was pronounced congestion and edema of the ocular and palpebral parts of the conjunctiva occurring on the ninth day of sulfathiazole medication, in a patient confined to the ward and in whom a very slight rash appeared. Of 13 cases treated at the Massachusetts General Hospital with sulfathiazole in moderate dosage, 6 showed a rash—a much higher incidence than has previously been reported.

SUMMARY

It can be said that the rashes occurring in the course of therapy with sulfanilamide or its derivatives are multiform in character and are not specific, with the possible exception of those following the use of sulfathiazole; that they may be manifestations of toxemia, sensitization or allergy; that they may occur at any time in the course of treatment, but generally from the fourth to the fourteenth day, and in from 2 to 30 per cent of the cases, depending on the intensity of treatment. They are likelier to appear in areas exposed to sunlight and may be accompanied by an increase in the excretion of porphyrins. The occurrence of a rash is a warning of danger, and treatment with sulfanilamide or its derivatives should be stopped and not renewed unless the gravity of the case warrants it; if treatment is to be resumed the patient should be tested for sensitivity with small (0.3 gr.) doses of the drug.

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REFERENCES

- Loewy, F. E. Thrombopenic haemorrhagic purpura due to idiosyncrasy towards the hypnotic Sedormid. *Lancet* 1:845, 1934.
- Loveman, A. B. and Simon, F. A. Fixed eruption and stomatitis due to sulfanilamide. *Arch. Dermat. & Syph.* 40:29-34, 1939.
- Thompson, A. R. M & B 693 rashes, with particular reference to acute exanthemata. *Brit. M. J.* 2:13, 1939.
- Townsend, T. M. and Mulcahy, T. M. Sulfanilamide in treatment of urological infections. *New York State J. Med.* 38:833-835, 1938.
- Newman, B. A. and Sharlit, H. Sulfanilamide: photosensitizing agent of skin. *J. A. M. A.* 109:1036, 1937.
- Brunsting, L. A. Sulfanilamide dermatitis: question of relation to photosensitivity. *Proc. Staff Meet., Mayo Clin.* 12:614-616, 1937.
- Rimington, C. and Hemmings, A. W. Porphyrinuria following sulphani- lamide: sulphani- lamide dermatitis. *Lancet* 1:770-776, 1938.
- Brunsting, L. A., Brugsch, J. T. and O'Leary, P. A. Quantitative investigation of porphyrin metabolism in diseases of the skin. *Arch. Dermat. & Syph.* 39:294-307, 1939.
- Long, P. H. and Bliss, E. A. *The Clinical and Experimental Use of Sulfanilamide, Sulfapyridine and Allied Compounds.* 319 pp. New York: The Macmillan Co., 1939.
- Haviland, J. W. and Long, P. H. Skin conjunctival and scleral reactions in the course of therapy with sulfathiazole. *Bull. Johns Hopkins Hosp.* 66:313-318, 1940.

CRIMINAL ASPECTS OF FAITH HEALING

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THE question that this article seeks to answer is, What are the criminal aspects of faith healing and its practice, particularly when infant children die as a result of lack of medical care that their parents refuse to provide because of their religious convictions as members of a faith-healing cult? To understand the several criminal aspects of this question, it is necessary to know what faith healing means. Faith healing is simply the treatment of human ailments, injuries and diseases by mental and spiritual means, that is, by mental "reasoning," argument and prayer. Because of the strong emotional appeal that faith healing has for the public in general, this age-old doctrine has been exploited by numerous "founders and discoverers" of faith-healing sects, especially in the last hundred years.

The first point to consider in this article, therefore, is how the courts have viewed the subject of faith healing itself. In a Pennsylvania case,¹ the court stated:

Common faith of mankind relies not only upon prayer, but [also medical care]. . . . Our laws recognize disease as a grim reality to be met and grappled with as such. . . . It may be said that the wisdom or folly of depending upon the power of inaudible prayer alone, in the cure of disease, is for the parties who invoke such a remedy. But this is not wholly true. "For none of us liveth to himself, and no man dieth to himself," and the consequence of leaving disease to run unchecked in the community is so serious that sound public policy forbids it. Neither the law, nor reason, has any objection to the offering of prayer for the recovery of the sick. But in many cases both law and common sense require the use of other means [medical care] which have been given to us for the healing of sickness and the cure of disease. There is ample room for the office of prayer, in seeking for the blessing of restored health, even when we have faithfully and conscientiously used all the means known to science and the art of medicine.

As clearly indicated by the reasoning of the court in this case, faith healing constitutes a grave menace and danger to the public health, when used as a substitute for medical care, especially when infectious and contagious diseases are involved. For this reason, as well as others, the courts have viewed with strong disfavor,² and have even condemned,³ any institution that encourages the growth and spread of faith healing. At present,

the law is well established that as a matter of public policy the proper public authorities may restrict and even prohibit the practice of faith healing if it should in any way endanger the public health.⁴

Having given sufficient consideration to the subject of faith healing itself, the next point to consider is whether the practice of faith healing constitutes a violation of the several medical-practice acts. Although practically all the medical-practice acts expressly exempt "those persons who endeavor to heal or cure the sick and suffering by prayer or spiritual means or as an exercise of the tenets of their religion" from their penal provisions, a large number of faith healers of various cults have been convicted in many states on criminal charges for violation of these acts.⁵ In those cases in which the courts have held that faith healers do come within this statutory exemption, the treatment is exclusively spiritual and religious,⁶—that is, confined solely to prayer,⁷—and is not accompanied by the use of any physical means whatever. A faith healer would therefore be subject to the penal provisions of any of the several medical-practice acts if he also made use of any of the following physical agencies or means: giving a diagnosis of the patient's ailment, injury or disease,⁸ giving treatment based on such a diagnosis,⁹ asking pertinent questions of the patient as to his ailment, giving massage,¹⁰ recommending or giving any herbs, liquids,¹¹ chemical preparations,¹² or physical exercises, using any physical instrument, giving directions as to food or diet,¹³ or directly advising the patient to discontinue or abstain from medical or surgical treatment.¹⁴ Faith healers may also be prohibited from giving treatments that might endanger the public health,⁴ especially if they are violative of statutory quarantine and sanitary regulations. Even in those cases in which the faith healer confines his treatments exclusively to spiritual means, he may be subject as an offender of the medical-practice act when it is shown that he is exploiting faith healing for commercial profit. As was well stated by a Colorado court¹⁴:

One is not authorized . . . under the cover of religion or a religious exercise . . . to go into healing commercially for hire, using prayer as the curative agency or treatment. Religion cannot be used as a

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shield to cover a business undertaking.* . . . The practice of medicine, defined by our statute, means the practice of the healing art commercially, regardless of the curative agency employed.† The commercial practice of healing by prayer, followed as a money-making venture or occupation, is the practice of medicine within the plain meaning of the statute.¹⁵

This ruling is particularly applicable when the faith healer gives treatments to his patients in an office building, apart from his own home or the home of the patient, or in the church edifice, and there charges compensation for his treatments.¹⁶

When a faith healer is prosecuted for a criminal violation of the medical-practice act, the issue of constitutional religious freedom is always raised. On this point, however, the law is well settled: although the government may not interfere with mere religious belief and opinions, it can prohibit and punish religious practices that are criminal offenses.‡ Since the violation of a state medical-practice act is a criminal offense, it can readily be seen that a faith healer whose practices make him guilty of such an offense⁵ may not claim the defense of constitutional religious freedom.¹⁹

The next and most important point for consideration is the criminal responsibility of parents who allow their infant children to die as a result of their refusal to provide them with the necessary medical care, because of a conscientious belief in faith healing. Under the law, medicines and medical attention furnished an infant, when his health or physical condition requires them, are necessities because they answer the bodily needs of the infant.²⁰§ By the law of Nature, as well as the common law, and independently of statute,

*A school for training faith healers was held irreligious because founded solely for the pecuniary benefit of its founders and officers.³

†The giving of treatment by a faith healer for a fee constitutes the practice of medicine and makes the faith healer subject to criminal prosecution.¹⁵

‡The First Amendment to the Constitution of the United States declares that "Congress shall make no law respecting an establishment of religion or prohibiting the free exercise thereof." This amendment, which guarantees religious liberty and which exists in similar paraphrased form in all the state constitutions, has been interpreted to mean "to allow everyone under the jurisdiction of the United States to entertain such notions respecting his relations to his Maker and the duties they impose as may be approved by his judgment and conscience, and to exhibit his sentiments in such form of worship as he may think proper, not injurious to the equal rights of others, and to prohibit legislation for the support of any religious tenets, or the modes of worship of any sect . . . It was never intended or supposed that the Amendment could be invoked as a protection against legislation for the punishment of acts inimical to the peace, good order and morals of society . . . However free the exercise of religion may be, it must be subordinate to the criminal laws of the country, passed with reference to actions regarded by general consent as properly the subjects of punitive legislation . . . Should a sect [with tenets encouraging crime] ever find its way into this country, swift punishment would follow the carrying into effect of its doctrines, and no heed would be given to the pretence that, as religious belief, their supporters could be protected in the exercise by the Constitution of the United States."¹⁷ "To permit a man to excuse his criminal practices because of his religious belief . . . would be to make the professed doctrines of religious belief superior to the law of land, and in effect permit every citizen to become a law unto himself. Government could exist only in name under such circumstances."¹⁸ Therefore no plea of religion can shield a person who commits a criminal offense, because the public would be at the mercy of superstition, if criminal offenses could be "committed with impunity, because sanctioned by some religious delusion."¹⁹

§"It is undisputed that medicine is a science, is now and has been for a long period of time, generally recognized by the law, and the efficacy of medical treatment by a skilled and competent physician is universally conceded."²¹

it may be generally stated that parents are under an obligation to care for their young in sickness and in health, and to do whatever may be required for their care and maintenance, including medical attendance if necessary. The failure to provide such medical care is a public wrong, and if the infant child is injured, the parent can be convicted of the criminal neglect of his child¶; should the child die as a result of such neglect, the parent would be guilty of manslaughter.²³ The law is the same in such cases, even though the neglect of the parents was due entirely to their superstitious or conscientious opinions that it is wrong and irreligious to provide medical aid for their children or themselves.²⁴ In other words, the law may be stated to be that a parent, guardian, relative or any other person, who has the custody of a person "who is unable, by reason of . . . age . . . to withdraw himself from such charge, [is under a duty] to supply that person with the necessities of life, medical attention . . . included, and that where one by reason of his religious belief fails to provide medical treatment for a child, he may in case of the death of the child, be convicted of manslaughter."²⁵¶¶

In the leading English case,²⁶ the defendant was the father of an eight-month-old infant. The child died of diarrhea and pneumonia. The prisoner had not supplied his child with any medical care, because he was a member of a sect, called the "Peculiar People," which believed in faith healing and disbelieved in the necessity of physicians and medicines. The medical testimony was that medical assistance would certainly have prolonged and in all probability would have saved the child's life. The prisoner was indicted under a Prevention of Cruelty to Children Act, which read: "If any person . . . who has the custody, charge or care of any child . . . wilfully . . . neglects . . . such child . . . in a manner likely to cause such child . . . injury to health, that person shall be guilty of a misdemeanor." The prisoner was convicted of manslaughter. In affirming the manslaughter conviction, the eminent Chief Justice Lord Russell declared:

The [meaning of the] words in the statute, "wilfully neglects" . . . is very clear. "Wilfully" means that the act is done deliberately and intentionally, not by accident or inadvertence, but so that the mind of the person who does the act goes with it. "Neglect" is the want of reasonable care, that is, the omission of such steps as a reasonable parent would take, such as are

¶A father, who refused to allow his infant child to be operated on for adenoids, which were impairing the child's health, was held to be liable for criminally neglecting to provide his child with medical care.²³

¶¶To sustain a manslaughter conviction in these cases, it is necessary for the medical testimony to show that the neglect to obtain medical care hastened or caused the death of the child, and not merely that the medical care would have prolonged the life of the child.

usually taken in the ordinary experience of mankind, that is, in such a case as the present. At the present day, when medical aid is within the reach of the humblest and poorest members of the community, it cannot reasonably be suggested that the omission to provide medical aid for a dying child does not amount to neglect. Mr. Sutton [counsel for the prisoner] contended that because the prisoner was proved to be an affectionate parent, and was willing to do all things for the benefit of his child except the one thing which was necessary in the present case, he ought not to be found guilty of the offense of manslaughter, on the ground that he abstained from providing medical aid for his child in consequence of his peculiar views in the matter, but we cannot shut our eyes to the danger which might arise if we were to accede to that argument, for where is the line to be drawn? In the present case, the prisoner is shown to have had an objection to the use of medicine, but other crises might arise, such, for instance, as the case of a child with a broken thigh, where a surgical operation was necessary, which had to be performed with the aid of an anesthetic. Could the father refuse to allow the anesthetic to be administered? Or take the case of a child that was in danger of suffocation, so that the operation of tracheotomy was necessary in order to save its life, and an anesthetic was required to be administered. I am of the opinion the conviction ought to be affirmed.

Likewise in accord with the preceding authoritative English case is the leading Canadian case.²⁷ Here, the defendant was a Christian Scientist. He was the father of a six year-old boy. The child was ill with diphtheria and subsequently died of the disease. During the time that the boy was ill, he was given Christian Science treatments by a Christian Science "demonstrator." The prisoner, a man of financial means, admitted that if he had not been a Christian Scientist, he would have called in a physician. He was indicted under the criminal code for failing to supply necessities for his child, that is, to provide medical care, and he was convicted of manslaughter. In affirming the conviction, the Ontario Court of Appeals declared

No matter how earnestly a parent might believe in the efficacy of Christian Science treatment, as developed in Mrs. Eddy's handbook of the doctrines of the sect, yet if they came to the conclusion that medical aid and treatment was necessary, they ought also to find that it would not be furnished by means of mental treatment by a Christian Science demonstrator. Persons sui juris may by mutual consent, and within certain limits, practice upon each other what experiments of this kind they please. But it would be shocking if in the case of infants or others incapable of protecting themselves, they and the community in which they live were to be exposed to the danger from contagious or infectious diseases which the instructed common sense of mankind in general does not as yet find or admit to be curable by means only of subjective or mental treatment.

Also in accord with the reasoning of the English and Canadian authorities are the American

courts. In the leading American case,²⁸ the defendant had a sixteen month old daughter, who contracted whooping cough, which afflicted her for thirty days, when catarrhal pneumonia developed and caused her death three days later. The defendant testified that forty eight hours before the child died, he observed that her symptoms were of a dangerous character, but that he did not send for or call a physician to treat her, although he was financially able to do so. His reasons for not doing so were that he was a member of a faith healing sect, known as the Christian Catholic Church, the teachings of which denied the need of medical aid, and that his religion led him to believe that the child would get well by prayer. The defendant was indicted and convicted of a misdemeanor. In affirming the conviction, the Court of Appeals of New York declared

The peace and safety of the state involves the protection of the lives and health of its children as well as the obedience to its laws. Children when borne into the world are utterly helpless, having neither the power to cure for, protect or maintain themselves. They are exposed to all the ills to which the flesh is heir, and require careful nursing, and at all times, when danger is present, the help of an experienced physician.

A person cannot, under the belief or profession of [religious] belief that he should be relieved from the care of children, be excused from punishment for slaying those who have been borne to him.

Although the father was convicted only of a misdemeanor, one commentator²⁹ stated that it does not appear why the father "was not indicted for manslaughter, since his child died as a result of his failure to provide medical aid."

In two Pennsylvania cases,^{30 31} in which the facts were similar to the Pierson case, the conviction of the father on manslaughter charges was affirmed. In its reasoning for its decision, one Pennsylvania court³⁰ declared

If the case of sickness be such that ordinary prudence would suggest the services of a physician and the use of proper medicines, then such services and medicines would be necessities in that case, and failure to employ the one and use the other, if reasonably within reach, would be negligence on the part of the person on whom the duty rested and if by reason of such neglect on the part of the father, the death of a child ensues, he would be guilty of manslaughter.

In the other case,³¹ the court stated that the father cannot relieve himself of his legal duty to provide medical care to his child,

because of some religious or conscientious belief. In no instance is this more true than in the case of a helpless infant unable to take any action for its own assistance or relief and incapable of exercising judgment as to what should be done. If persons were permitted

to plead, as giving them immunity from acting contrary to enactments of law, their religious belief, . . . the whole policy of the state relative to health laws would be defeated.

Because such neglect on the part of a parent to provide the necessary medical care to his infant child is pursuant to a religious belief, and is a religious practice, which nonetheless is a criminal offense,²⁵ the defense of constitutional religious freedom is of no avail in such cases.¹⁷⁻¹⁹ If the infant child dies, the faith healer can be convicted as an accomplice, as an accessory before the fact,³² or even as a principal, on manslaughter charges, if the evidence shows that, in addition to prayer, he made use of any physical means or agency.*

*In two cases,³³ faith healers were acquitted because they confined their treatments exclusively and solely to prayer.

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REFERENCES

1. First Church of Christ, Scientist, 205 Penn. St. 543, 55 Atl. 536 (1903).
2. Lange v. Hoyt, 114 Conn. 590, 159 Atl. 575 (1932).
3. In re St. Louis Institute of Christian Science, 27 Mo. App. 633 (1887).
4. State ex rel. Stone v. Probst, 165 Minn. 361, 206 N. W. 642 (1925).
5. *Christian Science practitioners*: State v. Marble, 72 Ohio St. 21, 73 N. E. 1063 (1905); State v. Buswell, 40 Neb. 158, 58 N. W. 728 (1894); Kansas City v. Baird, 92 Mo. App. 204 (1902). *Spiritualist healers*: People v. Krause, 291 Ill. 64 (1920); People v. Vogelgesang, 221 N. Y. 290, 116 N. E. 977 (1917). *Faith healers*: Smith v. People, 51 Col. 270 (1911); People v. Moser, 176 Ill. App. 625 (1913); People v. Jones, 92 Ill. App. 447 (1900); People v. McTier, 184 Ill. App. 635 (1914); Rex v. Brooks, 9 Brit. Col. 13 (1902); State v.

- Peters, 87 Kan. 265, 123 Pac. 751 (1912); State v. Pratt, 92 Wash. 200, 158 Pac. 981 (1916). *Magnetic healers*: People v. Gordon, 194 Ill. 560 (1902); People v. Trenner, 144 Ill. App. 275 (1908); Parks v. State, 159 Ind. 211 (1902). *Yogi healer*: Singh v. State, 66 Tex. Cr. R. 156 (1912). *Christian Philosopher healer*: People v. Cosper, 76 Cal. App. 597, 245 Pac. 466 (1926). *Altrurian Society healer*: Fealy v. City of Birmingham, 15 Ala. App. 367, 73 So. 296 (1916).
6. People v. Jones, 92 Ill. App. 447 (1900). State v. Mylod, 20 R. I. 62, 40 Atl. 753 (1898). Evans v. State, 9 O. D. 222 (1889).
7. People v. Klinger, 292 Ill. App. 321 (1937).
8. State v. Pratt, 92 Wash. 200, 158 Pac. 981 (1916).
9. People v. Cosper, 76 Cal. App. 597, 245 Pac. 466 (1926). State v. Mylod.⁶
10. People v. Gordon, 194 Ill. 560 (1902).
11. People v. Trenner, 144 Ill. App. 275 (1908).
12. People v. Vogelgesang, 221 N. Y. 290, 116 N. E. 977 (1917).
13. Regina v. Beer, 32 Can. L. J. 416 (1895).
14. Smith v. People, 51 Col. 270 (1911).
15. State v. Buswell.⁶ State v. Marble.⁶
16. People v. Cole, 219 N. Y. 98, 113 N. E. 790 (1916).
17. Davis v. Beason, 133 U. S. 333 (1889).
18. Reynolds v. United States, 98 U. S. 145 (1878).
19. State v. Marble, 72 Ohio St. 21, 73 N. E. 1063 (1905).
20. 31 C. J. 1079. 14 R. C. L. 258.
21. State v. Chenoweth, 163 Ind. 94 (1904).
22. Oakley v. Jackson, L. R. 1 K. B. (1914) 216.
23. State v. Staples, 126 Minn. 396 (1914). Stehr v. State, 92 Neb. 755 (1913). State v. Barnes, 141 Tenn. 469 (1919).
24. 13 R. C. L. 858.
25. 29 C. J. 1159, 1160. 10 A. L. R. 1146. *Wharton on Homicide* (1907 ed.) No. 452. Queen v. Downes, L. R. 1 Q. B. Div. 25 (1875). State v. Sandford, 99 Me. 441, 59 Atl. 597 (1905). Rex v. Lewis, 6 Ont. L. Rep. 132, 1 B. R. C. 732 (1903). Commonwealth v. Hoffman, 29 Penn. Co. Ct. Rep. 65 (1903). Commonwealth v. Breth, 44 Penn. Co. Ct. Rep. 56 (1915). Rex v. Brooks, 9 B. C. R. 13 (1902). Queen v. Senior, L. R. 1 Q. B. Div. (1899) 238. State v. Chenoweth, 163 Ind. 94 (1904). Kansas City v. Baird, 92 Mo. App. 204 (1902). Queen v. Morby, L. R. 8 Q. B. Div. 571 (1882).
26. Queen v. Senior, L. R. 1 Q. B. Div. (1899) 283.
27. Rex v. Lewis, 6 Ont. L. Rep. 132, 1 B. R. C. 732 (1903).
28. People v. Pierson, 176 N. Y. 201, 68 N. E. 243 (1903).
29. 10 A. L. R. 1139.
30. Commonwealth v. Hoffman, 29 Penn. Co. Ct. Rep. 65 (1903).
31. Commonwealth v. Breth, 44 Penn. Co. Ct. Rep. 56 (1915).
32. Rex v. Brooks, 9 B. C. R. 13 (1902).
33. Rex v. Elder, 35 Manitoba 161, 44 Can. Crim. Cas. 75 (1925). Regina v. Beer. 32 Can. L. J. 416 (1895).
34. State v. Karsonky, 197 Wash. 87, 84 Pac. (2) 390 (1938).

MEDICAL PROGRESS

UNCOMMON INFECTIOUS DISEASES IN NEW ENGLAND*

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SINCE 1921, several infectious diseases have been recognized with increasing frequency in the United States. These include rat-bite fever, rickettsial diseases, Weil's disease, tularemia and brucellosis. Inasmuch as all these infections have been encountered in New England during the past few years, it seems proper and fitting that a few of the more important features and advances that have been recorded recently should be reviewed at this time.

HAVERHILL AND RAT-BITE FEVERS

In 1926, Place, Sutton and Willner¹ described an epidemic of illness in Haverhill, Massachusetts, which was characterized by fever, a skin eruption and arthritis. Parker and Hudson² isolated from the circulating blood and joints of these patients

an organism that was found to be identical with *Streptobacillus moniliformis*, which had been isolated independently from a single case by Levaditi, Nicolau and Poincloux.³ The blood of patients recovering from this disease also contained agglutinins against this particular organism. Previous to these observations Schottmüller,⁴ Blake⁵ and others had described a form of rat-bite fever in man that resembled in many respects the clinical features of the cases reported by Place, Sutton and Willner,^{1, 6} and the organisms isolated from these cases were similar to those obtained from the latter. More recently, organisms identical with those described in so-called "Haverhill fever" have been isolated from infections following rat bites in man^{7, 8}; and they have also been found in the arthritis of spontaneous polyarticular rheumatism in mice.^{9, 10} It seems clear, then, that mice and rats harbor this organism in their mouths, and that they may suffer from a form of arthritis as a re-

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sult of the infection. Moreover, following the bite of a rat, a form of rat-bite fever may develop in man that may resemble in all respects Haverhill fever.

One of the curious features about the Haverhill epidemic was the fact that it was thought to be due to the ingestion of infected milk; it is possible that the milk had become contaminated from a milker, since the first person known to have had the disease was found on a farm supplying raw milk to the community that was subsequently involved in the illness. It was also discovered that one cow on his farm had agglutinins in the blood against the organism causing the disease; however, the cow was disposed of before additional examinations could be made. It was suggested, of course, that the milk might have been infected from contact with rats and mice or even a human case. However, another possibility must certainly be considered in the future, namely, the occurrence of this organism or of one closely related to it in cows' milk.

In 1935, Klieneberger¹¹ was able to demonstrate a "pleuropneumonia-like organism" in all cultures of *S. moniliformis*. These organisms were designated as "L forms," and she considered them to be natural symbionts in all infections due to *S. moniliformis*. Other students of this organism have confirmed Klieneberger's valuable observations, but there have been several dissenting views concerning the interpretation of the significance of the L forms. Instead of accepting the interpretation of L forms as being due to distinct organisms, and therefore symbionts, it has been suggested that they are variants of the streptobacillus.^{8, 12} This matter requires further study, but if it can be demonstrated that organisms resembling those causing pleuropneumonia in cattle can be converted into streptobacilli, the possibility of human infection from milk becomes much more significant. Thus it may be seen that pleuropneumonia in cattle or *S. moniliformis* infection in rats or mice may be the sources of infection for a form of rat-bite fever in man or for cases of Haverhill fever. The clinical differences may be due to the portal of entry of the organism. To avoid confusion, it is suggested that these cases be called *S. moniliformis* infections rather than rat-bite fever or Haverhill fever.

It is well in any patient who has fever, skin eruption and arthritis to consider the possibility of *S. moniliformis* infection. If there has been a history of a recent bite by a mouse or a rat, or of the ingestion of raw milk, the diagnosis becomes likely. It can be established with certainty by isolating the organism from the blood or synovial

fluid or by detecting agglutinins in the circulating blood.

RICKETTSIAL DISEASES

Typhus and Rocky Mountain Spotted Fever

One of the major advances in the study of typhus and Rocky Mountain spotted fever during the last year was the announcement by Zinsser, Plotz and Enders¹³ of a method for producing vaccine on a large scale. Cox and Bell¹⁴ have also developed a vaccine that is effective in protecting animals. These vaccines will undoubtedly be subjected to clinical trial, and the results will be awaited with interest.

The development of antiserum against rickettsial diseases continues to attract attention, and progress has been reported by Topping.¹⁵ It is quite possible that the use of large amounts of antiserum in the treatment of these diseases will definitely reduce the fatality rate.

It is becoming increasingly clear that typhus and Rocky Mountain spotted fever are present in various parts of the United States. Welch and Jakmaul¹⁶ and Campbell and Ketchum¹⁷ have reported cases of Rocky Mountain spotted fever in New England, and cases are now recognized along the eastern seaboard with increasing frequency. Campbell and Ketchum pointed out that there are no essential clinical differences between the Eastern and the Western varieties of Rocky Mountain spotted fever, and Topping and Dyer¹⁸ have isolated the Western strain in the eastern part of the United States, so that it would be advisable to classify cases on the basis of virulence or of behavior in guinea pigs rather than according to geographic and clinical type.

Typhus or Rocky Mountain spotted fever should be suspected in any patient who has the symptoms and signs of an acute infection with a skin eruption, especially if there are symptoms and signs referable to the brain and meninges, and congestion of the conjunctivas. If one remembers that rickettsial diseases caused widespread damage and lesions of the capillaries, especially of the brain, meninges and skin, and in this way cause anatomic damage, it is much easier to understand the symptoms and signs. All patients suspected of having either disease should be questioned for the possibility of tick bites, or at least contact with ticks. The Weil-Felix test, which becomes positive between the eleventh and nineteenth days, usually establishes the diagnosis.

American Q Fever

The recent studies of Hornibrook and Nelson¹⁹ and Dyer, Topping and Bengtson²⁰ of an outbreak of pneumonitis, which was identified as being due

to the rickettsia of American Q fever, are among the most interesting and valuable contributions to the study of infectious diseases this year.

During the last five years, there has been an increasing interest in a group of infections characterized by bronchopneumonia of indeterminate duration, and various other clinical features such as skin eruption, pericarditis, hematuria, enlargement of the liver, spleen and lymph nodes, jaundice, migratory arthritis and encephalitis. Excellent clinical descriptions of this disease are available in the papers of Murray,²¹ Kneeland and Smetana,²² Longcope²³ and Reimann.²⁴ Efforts have been made to isolate a virus or other infective agents from the blood and exudates of these cases without conclusive results. For this reason the recent report¹⁹ of the finding of rickettsia among a group of 15 patients with pneumonitis has excited widespread interest. The epidemic occurred among workers in one building of the National Institute of Health in Washington in the spring of 1940. The rickettsia of Q fever was isolated from 3 of these cases, in 2 from the blood and in 1, which was fatal, from the spleen. From the epidemiologic studies there was no convincing evidence that either personal contact or the intervention of an insect vector was responsible for the transmission of the disease.

These observations should serve as a stimulus for further investigation of cases of pneumonitis in other parts of the country to determine whether the same agent is responsible for the disease elsewhere.

WEIL'S DISEASE

Cases of Weil's disease are being recognized with increasing frequency in the United States,

England by Jeghers, Houghton and Foley,²⁶ and Proger²⁷ has observed a case in his own practice.

The recognition of Weil's disease depends on the isolation of the *Leptospira icterohaemorrhagiae* from the blood or urine of the patient by means of inoculation of susceptible animals and on the appearance of specific agglutinins in the blood plasma. The first step in the diagnosis, however, is to consider the possibility in cases of obscure infection with or without jaundice, especially if there is an associated severe myalgia, nephritis, hemorrhages into the skin, conjunctivitis or aseptic meningitis. Such a possibility becomes strengthened if the patient is a sewer worker, fish-handler, slaughterhouse worker or miner, is known to have been swimming in stagnant or polluted water or has lived or worked in rat-infested premises. Persons who fall into the canals of Holland frequently develop the disease.

The clinical features of Weil's disease vary widely, depending on the severity of the infection; for purposes of description they may be divided into three stages, although some patients may not show any of the features characteristic of the second and third stages. The first stage is characterized by the sudden onset of all the symptoms of an acute infection, — fever, chills, nausea, vomiting, pain in the muscles, especially of the calves, conjunctivitis and herpes, — with leukocytosis. In a few patients all the signs of meningitis appear.²⁸ If the patient recovers within a few days after the onset of the illness, and does not develop jaundice, the diagnosis may never be established unless the possibility of the disease is considered and agglutination tests are carried out.

About half the cases go on to the second stage, in which jaundice appears and may be intense

TABLE 1. Summary of Clinical and Laboratory Findings in Various Stages of Weil's Disease.

FINDINGS	INCUBATION PERIOD (4-19 DAYS)	FIRST STAGE (4-7 DAYS)	SECOND STAGE (7-10 DAYS)	THIRD STAGE (10-21 DAYS)
Clinical	None	Fever, chills, muscle pains, nausea and vomiting, meningeal signs, conjunctivitis, herpes labialis hemorrhagica	Jaundice (50 per cent), enlarged liver, hemorrhages and signs of nephritis (commonest in patients with jaundice)	Fever,* nephritis
Laboratory	None	Leukocytosis (rarely above 20,000), spirochetes in blood and urine	Leukocytosis, icterus, nitrogen retention, spirochetes absent from blood but present in urine, antibodies present in blood	Spirochetes absent in blood and urine, antibodies present in blood

*The fever in 25 to 40 per cent of cases lasts 4 to 20 days.

and Blake²⁵ has recently reviewed the salient features of the disorder and collected all the reported cases. The case reported by Blake himself occurred in a dairyman who about ten days before the onset of the illness had been engaged in demolishing an old barn, which was infested with rats. Other cases have been reported in New

and associated with hemorrhages into the skin and from the mucous membranes of the nose and gastrointestinal tract; there may also be hematomas. The third stage, which frequently appears within the third week, is characterized by fever and, in some cases, nephritis. The various stages and the clinical course are shown in Table 1.

TULAREMIA

Tularemia is a rare disease in New England, only occasional cases having been reported. Badger²⁹ reported 1 case of the typhoidal form of the disease, and McKinn³⁰ observed 1. During the past year, Belding³¹ has isolated *Pasteurella tularensis* from the organs of a rabbit in Massachusetts. Accordingly, physicians should be on the lookout for clinical cases of tularemia, especially during the hunting season. An excellent review of tularemia has been made by Foshay³² during the past year, and this should be read in detail by those who are interested in the disease. A few of the salient features of the disease may be summarized as follows:

Tularemia, which is caused by infection with *Past. tularensis*, is usually acquired in human beings by contact with infected rabbits, squirrels, ticks or biting flies (deer flies). Other less common sources of infection are cat bites, and contact with dressed chickens that have become contaminated through handling by poultrymen who handle infected rabbits. Other animals that may serve as a source of infection for man are quail, opossum, pheasant, grouse, skunk, beaver and snapping turtle. Rare cases occur from personal contact or from handling infected pelts of rabbits. Laboratory infections have been noted, and eating infected, insufficiently cooked food is also a source.

The diagnosis of tularemia is made by isolating the organism from the circulating blood or foci of infection, or by detecting specific agglutinins in the blood plasma. The clinical features that naturally suggest the nature of the disease are the constitutional symptoms and signs of infection, a local ulcerative (primary) lesion with satellite lymphadenopathy, usually of the skin of the upper extremities, face or conjunctiva (92 per cent), and the presence of metastatic lesions in the lungs and pleura (20 per cent). In 8 per cent of reported cases prolonged fever without local signs is the outstanding feature of the illness.

A typical history is as follows. After the dressing of a rabbit during the hunting season, the skin of the fingers is accidentally broken. For several days, usually two to five but varying from one to ten, there are no local or general signs of infection. Then there is a sudden departure from health, with fever and all the accompanying signs of infection.

At the site of the original injury an ulcerative lesion develops in about two thirds of the cases and attracts the attention of the patient and his physician. There is an associated enlargement of the regional lymph nodes. In the remaining third, the lymph nodes in the neighborhood of the orig-

inal injury are first noticed to be enlarged. Visible lymphangitis is not common unless the infection is a mixed one. Nodular lymphangitis may be present in a few cases. Usually the primary lesion appears with the onset of the fever, but it may not develop for forty-eight hours after the onset. In some cases there is an initial bout of fever lasting from one to four days, which is followed by a remission of from one to five days, after which time the fever becomes elevated for a period ranging between two and four weeks. During this febrile period, signs of metastatic lesions in the lungs, liver, spleen or other organs may appear, so that the patient may develop the signs of pneumonia, pleural effusion, pyo-pneumothorax, pericarditis or enlargement of the liver or spleen, with or without jaundice.

In about half the cases, the lymph nodes suppurate, and they may break down as long as five months after the onset of the disease. Recurrent enlargement of the lymph nodes may occur as late as three months to three years after the initial infection. In the recurrent swellings of the lymph nodes, suppuration occurs in about half the cases, and the pus is commonly sterile.

Relapses may occur from eight months to two years after the onset of infection. The average duration of the infection is about four months. Local lesions last on an average about thirty days.

Death occurs in 6 to 10 per cent of cases. It is seen oftenest in patients over fifty years of age and in those with the septicemic form of the disease, or in persons with other debilitating diseases.

From the review and study of Foshay,³² there is convincing evidence that serum treatment shortens the course of the disease. Serum must be given early and in adequate amounts (30 to 180 cc). The evidence that chemotherapy shortens the course of the disease is still controversial.

Agglutination tests are the most reliable diagnostic tests. They usually become positive after the first ten days of the disease, but in some cases on record positive tests appeared as late as the fourth week. Once they appear, they are present for years.

Positive intradermal tests with the especially prepared antigens (organisms oxidized with nitrous acid) are commonly observed in the first week of the illness, before the agglutination tests become positive.

BRUCELLOSIS

In 1939, the second edition of Huddleson's³³ excellent monograph, *Brucellosis in Man and Animals*, was published. This is the most important

discussion of the subject in English during the last few years. Since 1924, this disease has been recognized in various parts of the United States with increasing frequency. Most physicians are familiar with its widespread existence, and attempts are being made to establish the diagnosis in all cases of prolonged unexplained fever.

The isolation of *Brucella abortus* from the circulating blood or from a localized area of suppuration establishes the diagnosis of brucellosis or undulant fever. In many cases, however, such isolation is impossible and it is necessary to rely on the clinical course of the disease, the agglutination reaction, skin tests and the opsonic index of the circulating polymorphonuclear leukocytes.

So far as is known, the infection arises oftenest from the ingestion of organisms with food. They gain entrance to the body through the gastrointestinal tract, and indirect evidence leads one to believe that they focalize in the liver, spleen, lymph nodes and other organs, where they may, in rare cases, set up areas of suppuration. Generally speaking, however, they do not produce abscesses, but local physical signs due to suppuration are by no means unknown. Areas of infection have been found in the bones and joints,—especially the spine and larger joints,—the meninges, the endocardium, the periosteum, the liver and spleen, the ovaries, the genitourinary tract and the blood vessels.

The infection usually occurs in persons who consume raw milk from infected cows, and in persons who handle infected material coming from cows, goats or pigs. Butchers, slaughterhouse men, farmers and veterinarians frequently have the disease in a latent form.

When the infective organisms are not isolated from the circulating blood or local areas of infection, the diagnosis may be suggested in a patient with low-grade or high, irregular fever, with moderate splenomegaly, without localizing signs of infection, with a normal or slightly increased leukocyte count and with an increase in the lymphocytes and mononuclear cells. In these cases, to establish a diagnosis one must use the other laboratory tests, the most useful of which is the agglutination reaction. An increase in the titer above 1:40, especially when the increase occurs as the disease advances, is of diagnostic significance. When the blood cultures and agglutination tests are negative, the use of the skin tests and the opsonic index may provide valuable indirect evidence of infection. A positive skin test may be present without a positive agglutination reaction, or with a negative opsonic index. This may be taken as an indication of hypersensitiveness to the

products of *Br. abortus*, and it must be interpreted in the same way as a tuberculin reaction; that is, the positive test may indicate a previous or a present infection. When there is a positive opsonic index and a positive skin test in a patient with fever but without a positive blood culture or agglutination reaction, these tests have less diagnostic significance, since they indicate that the patient has developed sufficient antibodies in the past to allow phagocytosis of organisms and to show a reaction to the products of *Br. abortus* when injected into the skin.

Summing up these tests, it may be said that a positive blood culture is the most valuable. The agglutination test ranks second. A positive skin test with a negative opsonic index comes third. A positive skin test and opsonic index, without other evidence of infection by this group of organisms, is of little positive value in the diagnosis.

Since this infection tends to focalize in certain areas, the patient may come under observation with symptoms and signs of a focal infection, or once the diagnosis has been established, these focal infections may appear. The following clinical manifestations may suggest undulant fever: relapsing or undulating fever, which may be low grade or continuous with negative blood cultures, a moderate splenomegaly and a normal leukocyte count with an increase of the lymphocytes and monocytes; an infective spondylitis; an intermittent hydrarthrosis; a suppurative arthritis; an enlargement of the liver and spleen, with hematemesis; pelvic abscess; an abscess of the periosteum; an endocarditis; infective mycotic aneurysm of a large artery; a low-grade meningitis.

On the whole, the treatment of brucellosis is unsatisfactory. Chemotherapy with the various sulfonamide drugs has yielded results that are in many ways difficult to assess. A review of the effects, by Blumgart and Gilligan,³⁴ indicates that sulfanilamide has occasionally been effective. In many cases, however, the results are disappointing, since relapses are observed following an apparent remission induced by the drug. It is fair to say that no chemotherapeutic agent so far developed will be effective in all cases. Wainwright³⁵ has reported favorable results in some cases following the use of neoarsphenamine.

One form of treatment that has been used extensively is the injection of brucellin. The results in 100 cases have been summarized by Huddleson,³³ whose conservative statements warrant most careful consideration. He states that from his experience there is no doubt that the course of the disease may be shortened, provided certain procedures are followed and an adequate amount

of material is used. According to Huddleson, the course of the disease is altered "by producing a systemic allergic reaction which in turn is accompanied by a neutrophilic leukocytosis and increase in immune opsonins." It is also his opinion that the efficiency of brucellin depends on the existence and continuation of a state of sensitization in the patient under treatment. The absence of a state of sensitization at the beginning of treatment or its disappearance during treatment will be followed by poor results following the use of brucellin. It is for these reasons that the dose must be varied from one patient to another. Those who are interested in this method of treatment should consult Huddleson's monograph.

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REFERENCES

- 1 Place E H, Sutton L E, Jr and Wilner O. Erythema arthriticum epidemicum. Preliminary report. *Boston M & S J* 124:285-287 1916
- 2 Parker, F, Jr and Hudson N P. The etiology of Haverhill fever (erythema arthriticum epidemicum). *Am J Path* 2:357-379 1926
- 3 Levaditi C, Nicolau S and Poincloux P. Recherches sur l'etiology de l'erythema arthriticum epidemicum. *Bull Soc Path Exot* 1916
- 4 Schottmuller H. Aetiology und Klinik der Bisskrankheit. *Organismus* 38:77-103 1914
- 5 Blake F G. The etiology of rat bite fever. *J Exper Med* 23:39-60 1916
- 6 Place E H and Sutton L E. Erythema arthriticum epidemicum (Haverhill fever). *Arch Int Med* 54:659-664 1934
- 7 Charles F H and Seaton, C V. Haverhill fever following rat bite. *New Eng J Med* 211:711-714 1934
- 8 Dawson M H and Hobby, G L. Rat bite fever. *Tr Am Phys* 1939
- 9 Levaditi C, Selbie F R and Schoen R. Les arthrites du rhumatisme polyarthritique spontané de la souris provoqué par le *Streptobacillus moniliformis*. *Compt rend Soc de biol* 103:1193-1197 1930
- 10 Levaditi C and Selbie F R. Mode de transmission de l'erythema polymorphe aigu epidemicum. *Compt rend Acad d sc* 189:1332, 1939
- 11 Kneberger E. The natural occurrence of pleuro pneumonia like organisms in apparent symbiosis with *Streptobacillus moniliformis* and other bacteria. *J Path & Bact* 40:93-105 1935. Further studies on *Streptobacillus moniliformis* and its symbiont. *Ibid* 42:587-598 1936
- 12 Dienes L and Edsall G. Observations on the L organism of Haverhill fever. *Proc Soc Exper Biol & Med* 36:740-744 1937
- 13 Dienes L. Further observation on the L organism of Haverhill fever. *Ibid* 39:365-371 1938
- 14 Zisser H, Plotz H and Enders J F. Mass production of vaccine against typhus fever and of the European type. *Science* 91:31 1940
- 15 Arc H R and Bell E J. Epidemic and endemic typhus protective value for guinea pigs of vaccines prepared from infected tissues of the developing chick embryo. *Pub Health Rep* 55:110-115 1940
- 16 Topping N H. Treatment of infected laboratory animals with immune rabbit serum. *Pub Health Rep* 55:41-46 1940
- 17 Welch N A and Jaknub F J. Rocky Mountain spotted fever: a case report. *New Eng J Med* 221:937-939 1939
- 18 Campbell F P and Ketchum W H. Rocky Mountain spotted fever: an analysis of seven cases including one laboratory infection. *New Eng J Med* 223:540-543 1940
- 19 Topping N H and Dyer B E. A highly virulent strain of Rocky Mountain spotted fever virus isolated in the eastern United States. *Pub Health Rep* 55:728-731 1940
- 20 Hornbrook J W and Nelson A R. An institutional outbreak of pneumonitis. I. Epidemiological and clinical studies. *Pub Health Rep* 55:1926-1954 1940
- 21 Dyer R E, Topping N H and Bengtson I A. An institutional outbreak of pneumonitis. II. Isolation and identification of causative agent. *Pub Health Rep* 55:1945-1954 1940
- 22 Murray M E. Atypical bronchopneumonitis of unknown etiology possibly due to filtrable virus. *New Eng J Med* 222:565-573 1940
- 23 Kneeland J, Jr and Smetana H F. Current bronchopneumonitis of unusual character and undetermined etiology. *Bull Johns Hopkins Hosp* 67:229-267 1940
- 24 Longcope W T. Bronchopneumonitis of unknown etiology (variety X): a report of thirty-two cases with two deaths. *Bull Johns Hopkins Hosp* 67:268-305 1940
- 25 Remann H A. An acute infection of the respiratory tract with atypical pneumonia disease entity probably caused by filtrable virus. *J A M A* 111:2377-2384 1938
- 26 Blake F G. Wells disease in the United States: report of a case in Connecticut. *New Eng J Med* 223:561-565 1940
- 27 Jeghers H J, Houghton J D and Foley J A. Wells disease: report of a case with postmortem observations and review of recent literature. *Arch Path* 20:447-475 1935
- 28 Proger, S H. personal communication
- 29 Lemiere A. *Maladies infectieuses* 309 pp. Paris: Masson & Cie 1937
- 30 Badger T L. Tularemia: report of a case of typhoidal form. *New Eng J Med* 220:187-191 1939
- 31 McManis C F. personal communication
- 32 Belding D S. personal communication
- 33 Foshay L. Tularemia: a summary of certain aspects of the disease including methods for early diagnosis and the results of serum treatment in 600 patients. *Medicine* 19:1-83 1940
- 34 Huddleson I F, Hardy A V, Debono J E and Gilmer W. *Bruceella* in Man and Animals. 339 pp. New York: The Commonwealth Fund 1939
- 35 Blumgart H L and Gilligan D R. The treatment of undulant fever with sulfanilamide and related compounds. *M Clin North America* 23:1193-1203 1939
- 36 Wainwright C W. Melioidosis infection: treatment with neotrisphenamine. *South M J* 30:600-605 1937

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27061

PRESENTATION OF CASE

A fifty-year-old housewife entered the hospital complaining of hematemesis.

Approximately a year and a half before entry the patient developed a vague sense of epigastric pressure unaccompanied by other symptoms and relieved by a slight adjustment of her corset in the form of padding at the upper edge. Three months before admission, over a period of several weeks, she noticed that food sometimes seemed to "catch" in her throat. There was no pain, and with a drink of water the food passed on. No other symptoms appeared until one night, six weeks before entry, the patient awoke feeling as though she were "floating on air." In addition, she felt nauseated and suddenly vomited about one pint of bright-red blood. This incident did not recur, but since then she had suffered from slight anorexia, weakness, easy fatigability, and shortness of breath on exertion. Her stools were black for four weeks thereafter. Following the hematemesis, her physician instituted a dietary regimen of milk and cream for two weeks, then strained vegetables and riced foods, with a bismuth powder after each meal. The patient had not lost weight. At no time did she have postprandial pain, dyspepsia, colic, constipation, diarrhea, jaundice, food intolerance or swelling of the abdomen or legs. There was no history of excessive alcoholic consumption.

The patient had had pertussis at forty, and twelve years before admission a "broken-down gland" in the right posterior neck, which was drained and healed readily. The family history was noncontributory.

On examination the patient was well developed and well nourished and in no apparent distress. Examination of the heart and lungs was negative; the blood pressure was 118 systolic, 80 diastolic. The abdomen was tender in the mid-epigastrium. Vaginal examination showed a parous introitus and leukorrhea. The cervix was large and badly lacerated with marked erosions. The uterus was retroverted; the fundus was not felt, and the vaults were clear. Rectal examination was negative.

The temperature, pulse and respirations were normal.

Examination of the urine was negative. Examination of the blood showed a red-cell count of 4,500,000 with a hemoglobin of 55 per cent, and a white-cell count of 7600 of which 53 per cent were polymorphonuclears. A blood Hinton test was negative.

The nonprotein nitrogen of the blood serum was 21 mg. per 100 cc., the chlorides 108.1 milliequiv. per liter and the serum protein 6.0 gm. per 100 cc. The vitamin C level was 1 to 2 mg. per 100 cc. A gastric analysis showed 20 cc. N/10 free hydrochloric acid, with a total acidity of 37 cc. after injection of histamine. Examination of the stools was negative.

A gastrointestinal series showed a 7.5-by-5-cm. mass arising from a broad base on the lesser curvature and posterior wall of the fundus of the stomach. The base of the tumor lay just posterior to the cardia. The surface of the mass was rather smooth, but slightly lobulated, and one deep crater-like depression was seen in its lateral portion. There was only a slight shift in the position of the mass when the patient was upright. The rest of the stomach showed no evidence of disease.

The patient was given vitamins and a 600-cc. blood transfusion. On the fifth hospital day a gastroscopic examination was performed. The instrument passed readily into the cardia; there was no evidence of disease in the esophagus, and the cardiac orifice appeared normal. The instrument was then passed a few centimeters inside the cardiac orifice, where a smooth gastric mucosa without normal gastric rugae was seen. It was not possible to be sure whether this was normal gastric mucosa or neoplasm, and hence no biopsy was taken. There was a small amount of bleeding, and because of this, gastroscopy with the flexible tube was postponed. The following day this procedure was repeated. The pylorus was well visualized and appeared normal, as did the antrum; peristalsis was normal. In the upper part of the body in the five o'clock position there was a smooth, rounded, elongated submucosal tumor that appeared to be approximately 5 by 7 cm. in diameter and elevated 1 to 1.5 cm. above the surrounding mucosa. There was no visible break in the mucosa overlying the tumor. Near its base the rugae started to pass over the tumor, but were gradually flattened out. The mucosa surrounding the lesion was markedly atrophic, with clearly visible vessels shining through. The tumor appeared to extend to within 1 cm. of the cardia without involving it. Another 600-cc. blood transfusion was given, and on the fourteenth hospital day an operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. ARTHUR W. ALLEN: In some ways I hesitate to have Dr. Holmes show us these x-ray films, because if the films bear out the description we have here in the text it brings the diagnosis down to one type of lesion. However, we shall see how difficult he can make it by his interpretation of the films.

DR. GEORGE W. HOLMES: The surprising thing is that some films show practically nothing abnormal and others show a very definite lesion. I presume that the latter present the correct picture, and I shall interpret them about as described in the record. There is a large smooth lobular mass in the fundus of the stomach with a well-defined crater in its center, a picture characteristic of one particular tumor. I suppose it is the same one you have in mind.

DR. ALLEN: Dr. Edward B. Benedict's description of this tumor confirms Dr. Holmes's interpretation.

We have, then, a patient with massive hemorrhage from the upper gastrointestinal tract.¹ According to the records in this hospital, this must fall into one of eight categories. The commoner causes of sudden massive hemorrhage are posterior-wall duodenal ulcer, gastric ulcer, gastrojejunal ulcer, esophageal varices, carcinoma of the stomach, hypertrophic gastritis, polyposis and leiomyoma. In this case we can rule out many of these lesions. We have no reason whatever to suspect the duodenum. We have no reason to suspect that this hemorrhage came from esophageal varices. The gastroscopist did not find gastritis. I do not believe that this is polyposis, because usually the polyps are multiple and do not show such a broad base as this tumor appears to have.

We do have to consider certain possibilities other than what I believe to be the obvious diagnosis. One cannot always be sure that a tumor, however smooth, however apparently submucosal, is not carcinomatous. Carcinomatous tumors are nearly always ulcerated, or if not ulcerated, they involve a much larger portion of the stomach than this one does. It is noteworthy that this tumor does not have a large ulcer crater, despite the presence of free hydrochloric acid in the stomach. We have recently reviewed all the gastric ulcers treated here in the past ten years and were much surprised to find what a high incidence of cancer there was in these patients beyond middle life, with a short story of indigestion. A person beyond middle life who has a gastric lesion with a short history has five times as much chance to have cancer as ulcer. We treat too many gastric ulcers conservatively, and let them get away

from us only to return in an inoperable state with obvious cancer. I think we can rule out such a possibility in this particular patient.

The tumors that are submucosal and that have a smooth surface as demonstrated both by x-ray and gastroscopy are apt to belong to the leiomyoma group. The majority of the patients who enter this hospital with leiomyoma of the stomach enter with massive hemorrhage, and most of them have a preliminary diagnosis of inoperable cancer when they get here. This location is not an uncommon one for leiomyoma. Two of the cases I have done have been so near the cardia on the posterior wall that to get them out without total gastrectomy the operation had to be done through an opening in the anterior wall of the stomach. Others have been found in various locations in the stomach, and the majority have been treated by partial gastrectomy. If one knew which of these tumors were benign, and a certain percentage of them seem to be entirely benign, one might get away with a local excision. In one of my cases that I did through the stomach, a smaller tumor than this one, the patient is alive and well after six years, with no evidence of recurrence. Another patient died four years after operation with jaundice and a palpable liver, so that although there was no autopsy confirmation, it is fair to assume recurrence. Quite a large percentage of them are malignant. They show sarcomatous degeneration and are usually termed leiomyosarcomas. Recently Ransom,² of the University of Michigan, reported on tumors of neurogenic origin in the abdomen, and about 8 of the 20 cases presented tumors of the stomach that looked grossly very much like the one that we are discussing today. Coller³ in discussing Ransom's paper called attention to the fact that if the histology of these tumors were more carefully reviewed more of them would be found to be of neurogenic origin.

The ulcer crater in the center of this smooth round tumor is characteristic of both the leiomyomatous and the neurogenic tumors. If one gets the specimen out one finds that the crater leads directly into a large blood vessel from which the hemorrhage comes.

One should mention the possibility of lymphoma in dealing with any intra-abdominal tumor, particularly one that is tender. So far as I know, I have not had the experience of seeing a lymphomatous lesion of the stomach that was admitted on account of massive hematemesis. In going over our ulcerative gastric lesions in the past ten years, we found only one benign tumor arising from the fundus of the stomach, and that was due to syphilis. This woman had a negative Hinton test, and nothing else about this case sug-

gests syphilis. Therefore, I shall make a diagnosis of leiomyoma of the stomach, possibly with sarcomatous degeneration, possibly a tumor of neurogenic origin.

DR. TRACY B. MALLORY: Are there any other suggestions? Dr. Homans, should you care to comment?

DR. JOHN HOMANS: No.

DR. MALLORY: Dr. Homans had a case very much like this some years ago that I remember reviewing. I was at that time interested in leiomyomas of the stomach, and a case at the Peter Bent Brigham Hospital was called to my attention. It seemed to me at first glance to be very typical, but Dr. Homans made a remark which I have not forgotten and which has influenced my thinking about these tumors ever since. He said, "I should be very cautious about accepting that as a leiomyoma, because she came back four years later with an intraspinal tumor, which Dr. Cushing removed. You had better be sure it is not a neurogenic fibrosarcoma."

DR. HOMANS: I remember the patient.

CLINICAL DIAGNOSIS

Leiomyoma of stomach.

DR. ALLEN'S DIAGNOSIS

Leiomyoma of stomach, with possible sarcomatous degeneration?

Neurogenic fibrosarcoma of stomach?

ANATOMIC DIAGNOSIS

Neurogenic fibrosarcoma of the stomach.

PATHOLOGICAL DISCUSSION

DR. MALLORY: This patient was operated on by Dr. Edward D. Churchill; I am sorry he is not here to describe his operation. Because of the very high location, he decided to approach the tumor through the transpleural route. That was done, and it was found that the tumor was in the fundus, far enough separated from the mouth of the esophagus to do a fundusectomy, close up the stomach and leave it in continuity with the esophagus. The patient made a very successful recovery and was discharged on the sixteenth postoperative day, completely relieved. The tumor was of about the size described in the x-ray reports and did show central ulceration. In contrast to a leiomyoma, which after all is nothing but a fibroid, this tumor was quite soft, and appeared very edematous and vascular. On microscopic examination it is evident that it is a spindle-cell sarcoma growing at a moderate rate of speed, with fairly numerous mitotic figures, but no multi-

nucleated giant cells or other evidence of a high degree of malignancy. Further diagnosis of the tumor rests on the minute histologic character, and I am not sure if it were shown to a group of pathologists that they would give a unanimous opinion. I should classify it as a neurogenic fibrosarcoma, not as a leiomyosarcoma. In sections stained with phosphotungstic acid the normal muscle of the stomach wall showed good myoglia fibrils, whereas I could demonstrate none in the tumor cells.

I wonder, Dr. Allen, if it would have been possible to have handled this case as satisfactorily with an approach from below.

DR. ALLEN: Being an abdominal surgeon I should have taken it out from below. I think that a shoemaker must stick to his last. We saw a case this morning on grand rounds, a carcinoma of the stomach involving, we thought, the lower end of the esophagus, and I suggested to Dr. Churchill that it would be a good case to do transthoracically, whereupon he said, "Well for the sake of argument, why not approach it from the abdomen?" Either approach is satisfactory.

REFERENCES

1. Allen, A. W. Acute massive bleeding from upper gastro-intestinal tract. *Internat. Clin.*, 4:205-223, 1937.
2. Ransom, H. K. and Kay, E. B. Abdominal neoplasms of neurogenic origin. *Ann. Surg.*, 112:700-746, 1940.
3. Collier, F. A. discussion of Ransom and Kay.²

CASE 27062

PRESENTATION OF CASE

A sixty-year-old man entered the hospital complaining of bronchitis and fatigue of eight years' duration.

The patient stated that for twenty years he had suffered from chronic constipation with gaseous eructations after meals and for the eight years before entry from bronchitis occurring each winter, with a daily production of half a cupful of greenish-yellow sputum. In addition, for the previous three years he had noticed anorexia, weakness, easy fatigability and lack of energy as well as moderate dyspnea on exertion and slight orthopnea, but no edema or paroxysmal nocturnal dyspnea. Six weeks before admission he suffered an attack of "bronchitis" with slight fever, and a mild cough with a small amount of sputum. Since then he had noticed that his sputum was blood streaked. Two weeks before admission the patient had a chill with fever, and developed a pain in his left chest. He went to bed, weak and exhausted with generalized aching, and complained of dyspnea, an increase in coughing and bloody sputum. There was no palpitation, peripheral

edema or weight loss, but he had a few night sweats. Furthermore, he complained of difficulty in starting urination, with dribbling and nocturia once or twice a night for an unstated period. At the time of admission he was raising small amounts of bloody, apparently purulent sputum.

On examination the patient was well developed and well nourished, lethargic, extremely uncooperative, flushed, slightly cyanotic and apparently ill. The brachial and temporal arteries were tortuous. The heart was moderately enlarged to the left, with a hifid apical impulse. The sounds were rapid and of poor quality with a presystolic gallop rhythm; the blood pressure was 138 systolic, 80 diastolic. Examination of the lungs revealed slight dullness to percussion at both bases; the diaphragmatic excursion was normal. There were many coarse crackling rales in the left axilla, and anteriorly and posteriorly at the left base. A few rales were heard at the right base. Examination of the abdomen was negative except for an easily reducible right inguinal hernia in the scrotum. The prostate was enlarged, smooth, soft and tender. Examination of the nervous system was negative.

The temperature was 101°F., the pulse 100, and the respirations 30.

Examination of the urine showed a ++ test for albumin. Examination of the blood showed a red-cell count of 5,060,000 with a hemoglobin of 100 per cent, and a white-cell count of 13,800 with 82 per cent polymorphonuclears. A blood Hinton test was negative. A gastric analysis gave a total fasting level of 2 cc. of N/10 hydrochloric acid per 100 cc., and a level of 6 cc. half an hour after the injection of histamine; there was no free acid, and a guaiac test was negative. The vital capacity of the lungs was 2000 cc. Examination of the stools was negative.

X-ray films of the chest showed a small amount of fluid in the left pleural cavity. The space between the gas bubble in the stomach and the diaphragm was unusually large, and there was a slight irregularity of the fundus of the stomach. The lung fields on both sides contained a number of rather poorly defined, approximately round areas of increased density measuring up to 2 cm. The heart was markedly increased in size, particularly to the left. The aorta was tortuous and slightly dilated.

A gastrointestinal series showed the esophagus to be normal. The deformity of the fundus previously described was seen to be produced by downward displacement of the fundus and not by intrinsic disease of the stomach. The downward displacement was apparently due to a slightly en-

larged spleen. There was no evidence of intrinsic disease of the upper gastrointestinal tract.

An electrocardiographic recording showed normal rhythm at 105, a PR interval of 0.18 second and a prominent P₂. The QRS complex was widened up to 0.08 second, with slurring and splintering. There was slight depression of ST₁ and ST₂, and elevation of ST₃ and ST₄. T₁ was slightly inverted, T₂ low.

The patient was given digitalis and one 2-cc. dose of mercupurin and appeared to improve satisfactorily, becoming more alert and co-operative. Four days after admission the temperature dropped to normal, the white-cell count to 10,000. X-ray examination of the chest showed the lesions to be slightly smaller than at the last examination. There was still a small amount of fluid in the left pleural cavity, and the heart was still enlarged, though slightly smaller. On the seventh hospital day marked tenderness was noticed in the left calf, with cordlike masses suggestive of thrombosed veins. Two days later the dullness and rales at the left lung base had disappeared, but the heart rate still averaged 100. Later that day the patient was found dead in bed.

DIFFERENTIAL DIAGNOSIS

DR. EDWARD F. BLAND: I suspect several pathologic conditions were found in this patient, but I think that the principal diagnosis involves an explanation for the cough, sputum, hemoptysis and sudden exitus. He was sixty years old, had had so-called "winter bronchitis" for a number of years, and had raised a fair amount of sputum. I assume that this annual winter bronchitis represented a low-grade pulmonary infection, with perhaps slight structural alterations in the bronchial tree. In addition, in view of what comes later, perhaps there had also been an element of circulatory weakness. The evidence—marked cardiac enlargement, a gallop rhythm indicating serious weakness and an abnormal electrocardiogram—seems to show clearly that on admission he had significant cardiac disease. There is nothing, however, in the story that particularly suggests a recent acute change in the heart. Furthermore, the patient appeared to improve on digitalis. We must therefore assume that he had serious cardiac disease, presumably on a coronary basis. He had no known hypertension, and we can be reasonably certain that he did not have valvular disease. I think his heart may have been of some importance in the final events, but not the chief cause of his exitus. Finally, he had benign hyperplasia of the prostate, which appears not to have had much bearing on his final illness. So much for the background of his illness.

It seems to me that the central problem involves the final illness, and the findings in the lungs are probably most important. I wonder if we might see the x-ray films now. I take it that the gastrointestinal tract was examined with such zeal because of the original chest film, which showed the gas bubble in the stomach not quite so close to the diaphragm as it should be. Otherwise, I think one might have hesitated to pass a stomach tube into a patient as sick as he appeared to be.

DR. GEORGE W. HOLMES: The increase in the distance between the gas bubble and the diaphragm is not positive evidence of any pathologic lesion, but is worth taking note of. The complete absence of abnormality of the mucosal folds in the fundus rules out, I think, tumor in this part of the stomach. The widening of the space may be due to distortion of the picture, or as pointed out in the record, to enlargement of the spleen. The most obvious finding in the chest films is the enlargement of the heart. The enlargement is general, perhaps a little more to the left than to the right, and the border of the left ventricle is prominent. It was stated in the report that the aorta was somewhat dilated as well as tortuous. I think that the dilatation was very slight, if existent at all. I do not believe he had syphilitic aortitis, or the marked dilatation we sometimes see with hypertension. The description of the lungs is a little misleading, because it gives the impression that the lesions might have been due to metastatic cancer. To me they do not look that way. The general thickening of the lung markings throughout the chest and the haziness on the right side might have been due to pleuritis, but in general the picture looks more like localized atelectasis, pulmonary infarct, acute respiratory infection or something of that sort.

DR. BLAND: There is not much evidence of congestion?

DR. HOLMES: No; that is not the picture of congestive failure.

DR. BLAND: The mediastinum looks all right?

DR. HOLMES: Yes.

DR. BLAND: In general when a patient of this age comes in coughing and raising sputum, with fever and hemoptysis, one would like to know what the sputum shows microscopically, and I think we can assume that it was not remarkable, since nothing was said about it. Certainly the course of the illness does not suggest either tuberculosis or pneumonia. After seeing the x-ray films, I think we can discard tuberculosis. I considered cancer at some length from the written report of the x-ray studies, but after seeing the films I am

inclined to discard that without serious consideration because the patient was in fairly good general condition, certainly not emaciated. The red-cell count was not down, and the onset of the disease does not particularly suggest a malignant lesion of the lung, either primary or secondary. I suppose, as noted previously, that the gastrointestinal tract was investigated so carefully because of the suggestion in the first chest films, but there was certainly no indication of disease from later x-ray study of the gastrointestinal tract or from examination of the stools. The patient probably did not have a tumor of the lung, either carcinoma or lymphoma. One can occasionally get hemoptysis with lymphoma, but it is very rare. Metastatic carcinoma of the lungs can rarely cause hemoptysis, but hemoptysis in the presence of cancer suggests primary bronchiogenic carcinoma.

Finally, we come to a consideration of what I think seems most likely; namely, that he had, complicating his heart disease and perhaps his chronic mild bronchiectasis, multiple pulmonary emboli with infarction. From the written description of the films, it seemed to me that either cancer or infarction of the lungs might be present. After seeing the films, there can be little doubt about the infarction. There was a good background for it. There is clear evidence of serious heart disease and some circulatory weakness, as shown by the gallop rhythm. The patient had a mild infection, to begin with, a chill, which usually means infection, and probably took to bed, which favored the development of deep phlebitis. Toward the end of his illness, signs of superficial phlebitis appeared in the veins of the left calf. Then we come to the sudden exitus interrupting his apparent improvement. We are on uncertain ground when we attempt to interpret the exact cause of death. He had serious cardiac disease, and something abrupt may have happened in connection with the heart, for example, ventricular fibrillation. Dr. Mallory may not find an obvious cause. On the other hand, since we are dealing with recurring pulmonary infarcts and obvious disease of the veins in one leg, it is somewhat likelier that he had a terminal pulmonary embolus.

DR. WILLIAM B. BREED: It is interesting that just prior to death, as I remember, he had a marked diuresis due to mercurial diuretics, and I wonder whether you would take that into consideration.

DR. BLAND: We have seen one or two things happen occasionally, especially in patients getting full doses of digitalis, if a vigorous diuresis follows the use of mercurial diuretics. Such a diuresis sometimes increases the effect of the digitalis.

We have seen patients become mildly toxic from digitalis under such circumstances. I have seen one patient recently who developed a cerebral thrombosis the night following a vigorous diuresis. Whether that was chance or was caused by a concentration of the blood, I do not know.

CLINICAL DIAGNOSES

Arteriosclerotic heart disease.
Mild congestive failure, with pulmonary congestion.
Pulmonary embolism.
Bronchiectasis?
Carcinoma of lung?

DR. BLAND'S DIAGNOSES

Recurring pulmonary emboli.
Pulmonary infarction (multiple).
Coronary heart disease.
Phlebitis, left leg.
Bronchiectasis, mild.
Prostatic hypertrophy.

ANATOMIC DIAGNOSES

Coronary thrombosis, old and recent.
Myocardial infarction, old.
Mural thrombus, left ventricular.
Arteriosclerosis, coronary, aortic and generalized, severe.
Pulmonary infarcts, multiple.
Pericarditis, chronic, fibrous.
Rheumatic heart disease, aortic valvulitis, slight.
Infarcts of spleen.
Thrombosis of popliteal vein, left.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: The post-mortem examination showed multiple pulmonary infarcts, most of them recent, although one showed evidence of organization and must have been present for a few weeks before death. The immediate

mechanism of death was not a massive pulmonary embolus. The heart was very markedly hypertrophied—575 gm. The left ventricle was much dilated as well as hypertrophied, and its entire apex consisted of a fibrous scar, overlying which was a partially organized thrombus. All the coronary arteries were markedly sclerotic, and the lumens reduced merely to slits. The main branch of the right coronary artery was completely occluded by an old organized thrombus, and the remaining portion showed a quite fresh thrombus, which I think was the immediate cause of death. There was no visible recent infarction in the heart. A very slight rheumatic deformity of the aortic valve was found, but was not, I believe, significant.

A PHYSICIAN: Had there been any story of angina?

DR. MALLORY: No.

DR. DONALD S. KING: Was there a chronic bronchitis?

DR. MALLORY: Not of significant grade.

DR. HOLMES: Do you think the pronounced curve in the left ventricle was due to aneurysm?

DR. MALLORY: We did not classify this as an aneurysm of the heart, although there was certainly localized dilatation.

DR. BLAND: May I ask Dr. King a question? I am uncertain what they meant by "winter bronchitis."

DR. KING: So was I. That is why I asked the question.

DR. MALLORY: I can say that there was no chronic bronchiectasis, and a little inflammatory infiltration in the bronchial walls is so usual that we do not pay much attention to it.

DR. KING: What about the spleen?

DR. MALLORY: It was somewhat enlarged. There was a localized infarct of the upper pole, definitely adherent to the diaphragm, which I think could have resulted in pressure on the fundus of the stomach.

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal
Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of
THE MASSACHUSETTS MEDICAL SOCIETY
and
THE NEW HAMPSHIRE MEDICAL SOCIETY

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SUBSCRIPTION TERMS: \$6.00 per year in advance, postage paid, for the United States; Canada, \$7.04 per year; \$8.52 per year for all foreign countries belonging to the Postal Union.

MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

CHEMOTHERAPY AND SEROOTHERAPY OF PNEUMONIA

THE season for severe respiratory infections has arrived, and the number of pneumonia cases is soon expected to reach its peak. Physicians are fortunate in having available powerful weapons with which to combat this highly fatal disease. Properly used, they are expected greatly to reduce the number of deaths from pneumonia.

The first line of therapeutic attack will be through the use of chemicals. During the present season this will mean either sulfapyridine or sulfathiazole. It has been difficult to judge which of these two drugs is superior. Each has its favorable and its unfavorable features. These have been summarized in a recent review* in the

*Finland, M. Treatment of pneumonia. *New Eng. J. Med.* 223:499-506, 1940.

Journal. In general, because sulfathiazole produces nausea and vomiting less frequently and of less severity, it will probably be the drug of choice, particularly when patients are treated in the home. The mortality rate in cases treated with sulfathiazole, according to available published reports, is about the same as that in cases treated with sulfapyridine. Two points concerning the use of drugs in the treatment of pneumonia are worth repeating. The first is that sulfanilamide should not be used in the treatment of cases of acute pulmonary infection unless the infection is known to be due to a hemolytic streptococcus, and then only if sulfapyridine in adequate doses is not well tolerated. In the second place, failures from chemotherapy are to be expected, and under such conditions, changing from sulfapyridine to sulfathiazole, or vice versa, will probably not be successful except in those cases in which the change is made because of some toxic effect. Serum should be given in such cases, provided a specific type of pneumococcus is causing the infection.

In this issue of the *Journal* appears the reprint of a circular, issued by the Massachusetts Department of Public Health, concerning the use of sulfapyridine, sulfathiazole and specific serums in the treatment of pneumococcal pneumonias. When sulfapyridine was first introduced, many extreme views were expressed concerning the relative merits of drugs and serums. It is now recognized that both agents are effective and that they differ fundamentally in their mode of action. Almost all workers in the field of pneumonia therapy are now agreed that a certain proportion of cases of pneumococcal pneumonia fail to show adequate response to proper therapy with either sulfapyridine or sulfathiazole alone. Such failures in no wise alter the chances for success with antipneumococcus serums. Since serotherapy is highly specific, it is essential to be prepared for all contingencies by obtaining sputum for typing and blood for culture before treatment with drugs is undertaken. Chemotherapy need not be withheld until the results of these laboratory procedures become known, except in individual cases in which

there are definite contraindications for drug therapy. Fortunately, the latter are rare.

Early treatment with sulfapyridine or sulfathiazole offers the greatest hope for reducing the mortality from pneumonia and of bringing about rapid cures. Serum therapy is reserved for severe cases and for those in which drugs are contraindicated. In all such cases the greatest success from serotherapy is to be expected if the serum is administered early. It should also be used in all other cases due to specific types of pneumococci when, after a trial of from twenty-four to thirty-six hours, an adequately favorable response to chemotherapy has not been obtained.

The recommendations of the Massachusetts Department of Public Health in regard to the procedures to follow and the indications for drugs or for serums, or for the combination of chemotherapy and serotherapy, are a result of the summation of the experiences of a number of leading clinicians in this field. They are not absolute but are the best guide now available if one is to obtain optimum results.

The Department of Public Health is now distributing suitable containers for blood cultures. Physicians should avail themselves of this service, since pneumococcal typing is simplest and most reliable when positive blood cultures are used. Furthermore, the results of blood cultures offer the best guide for prognosis and for serum therapy. In addition, the Department of Public Health is furnishing serums for the treatment of all patients in whom positive blood cultures for specific pneumococcal types are obtained. All this should be adequate inducement to the physician for the slight additional effort required in taking such blood cultures. It should not, however, relieve him of the responsibility of seeing that sputum is properly collected and sent for typing as soon as possible after a clinical diagnosis of pneumonia is made or suspected.

CRIMINAL ASPECTS OF FAITH HEALING

To most citizens it is a novel idea that faith healing has criminal aspects, yet if one remembers

the saying of a distinguished historian that "liberty, next to religion, has been the motive for good deeds and a common pretext for crime," one should not be surprised that even the practice of faith healing may on occasion violate the law of the land. As the author of an article that appears elsewhere in this issue of the *Journal* points out, the government interferes, not with religious opinions, but with the acts of individuals, it discriminates among acts expressive of religious belief, no matter how logically or illogically they may be derived from the belief, and decides that some are in violation of the law and that others are not.

It is clearly within the rights of a community to protect itself from a communicable disease in any way approved by the best scientific opinion, whether by mere restraint or isolation or by specific treatment, according to the nature of the disease and the risk of transmission from the patient to other persons. If the disease is noncommunicable and occurs in an adult of sound mind, it is generally, if not always, agreed that it is for the patient to decide whether medical advice shall be sought, and if sought, whether it shall be followed. It is in the case of noncommunicable disease occurring in the legal "infant" that controversy has been most violent. Yet here also the decisions of the courts are clear: any person who has the custody of a child is under a duty to supply the "necessaries of life, medical attention . . . included."

One point about which the various statutes differ is the pertinence of compensation in establishing violation of the law. The more general view is that the compensation is mere proof of the fact that a service has been rendered, and that other evidence is required to determine whether it was a medical or some other service for which the fee was paid.

The number of citations of court opinion raises the question whether the magnitude of the danger demands a change in the statute. The problem is not to be attacked lightly, and the situation is one that should be explored thoroughly before a specific remedy is recommended. Just what the detailed facts are, no one knows, but

it is generally true that all persons who reject medical care because of religious scruples constitute, according to their number, a very grave peril to the health of the community. There are also the possibilities of much illness and many preventable deaths, which, where "infants" are concerned, the community certainly should prevent. If it does not know, it cannot act. The situation must remain serious, because in this field no competent and critical medical opinion is available. Is the true cause of death among those who are attended by faith healers ever known?

MEDICAL EPONYM

GHON TUBERCLE

In a monograph of 143 pages, Anton Ghon (1866-1936), professor of pathological anatomy at the German University in Prague, discussed *Der primäre Lungenherd bei der Tuberkulose der Kinder* [*The Primary Lung Focus in Childhood Tuberculosis*] (Berlin u. Wien, Urban u. Schwarzenberg, 1912). A portion of the translation follows:

My investigations go back to the year 1903. They originated without any knowledge of the work of Küss. . . . The results of my studies confirm the findings of Küss and H. Albrecht. They consequently contribute nothing essentially new.

We found primary lung foci in more than 75 per cent of our cases. . . . If . . . the number of primary lung infections should be reduced to even 90 per cent, they would still justify the conclusion that in the child, the primary infection of the lung is the usual form of tuberculous infection. Surely, this fact has great practical significance.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

ACUTE RHEUMATIC FEVER DEVELOPING DURING PREGNANCY

Mrs. E. B., a twenty-eight-year-old para III, was admitted to the hospital on May 21, 1940, when she was five months' pregnant. She had been referred from the prenatal clinic with a history of

passage of "bloody urine" for two days, with associated pain on urination, and marked weakness and night sweats since the onset of pregnancy.

The family history was noncontributory. The patient's past history included measles, whooping cough and scarlet fever. She had undergone a tonsillectomy as a child, and an appendectomy had been performed on March 25, 1940. The first pregnancy terminated in a normal delivery at eight months. The second pregnancy was complicated by albuminuria and hypertension and terminated in a breech extraction. Catamenia began at the age of thirteen, were regular with a thirty-day cycle and lasted five to six days without discomfort. The last regular period began on December 22, 1939, making the expected date of confinement, September 30, 1940.

The patient was first seen in the prenatal clinic on May 15. Physical examination at that time showed a well-developed, poorly nourished woman. The weight was 106 pounds. The heart was not enlarged; there was a harsh systolic murmur over the mitral area, transmitted to the axilla, and a soft systolic murmur was heard at the pulmonic area, not transmitted. The lungs were clear and resonant; there were no rales. The blood pressure was 120 systolic, 70 diastolic.

On admission to the hospital the patient was seen in consultation by a urologist, who advised kidney-function tests, x-ray studies and cystoscopy. A urinalysis showed a specific gravity of 1.018, a trace of albumin and a large number of red blood cells and an occasional white blood cell per high-power field. Blood examination showed a white-cell count of 10,200, a red-cell count of 3,930,000 and a hemoglobin of 74 per cent. The blood nonprotein nitrogen was 26 mg. per 100 cc., the uric acid 4.8 mg.; a phenolsulfonephthalein test showed 50 per cent excretion the first hour and 10 per cent the second. Stereograms of the chest showed increased hilar infiltration in both lungs. The heart was normal in size and position. Retrograde pyelograms of the right kidney showed a moderate degree of dilatation of the upper calyces and ureter; there was no evidence of calculi. Bladder culture at the time of cystoscopy revealed a few gram-positive cocci; the right-kidney culture was sterile. Diagnoses of hydronephrosis and hydroureter were made.

The patient was placed on a high-vitamin, high-calorie diet, with liver and iron therapy. On May 27, one week after admission, the patient's temperature rose to 101°F., and she complained of a sore throat. Examination revealed uniform redness of the postpharyngeal wall. On the following day she complained of tenderness and stiffness of the left knee and ankle. On examination

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

there were redness, swelling, tenderness and limitation of motion of the left knee and ankle. A medical consultation was held, and the consultant's impression was that the patient had acute rheumatic fever with early endocarditis. She was placed on salicylate therapy. Repeated urinalyses continued to show a slight trace of albumin and a large number of white blood cells in the sediment. On May 29 the blood white-cell count was 9100, on June 7, 14,100, on June 20, 11,800, on July 3, 14,300, and on July 26, 7200.

The patient also complained of recurring bouts of uterine contractions. These were controlled with medication. The uterus had increased to a size consistent with the date of the last menstrual period, the fetal heart tones were of good quality.

She continued to run a temperature ranging from 98 to 101°F. Two weeks after the onset of infection the left wrist and elbow became similarly involved. On July 20 the temperature dropped to normal, and remained at that level until delivery. The acute inflammation of the joints subsided shortly thereafter, leaving only a stiffness of the left ankle joint.

During hospitalization there were no signs or symptoms of cardiac decompensation. The blood pressure was never higher than 120 systolic, 70 diastolic.

The patient started in active labor spontaneously on September 12 at 10 a.m. Analgesia consisted of 6 gr of Nembutal. At 1:30 p.m., under light ether anesthesia, she was delivered of a living male child, weighing 6 pounds, 10 ounces. The puerperium was uneventful, and the patient was discharged on October 5.

Examination of the heart at the time of discharge showed no enlargement by percussion or x-ray. There was no rub. The rhythm was regular, the rate 76. The sounds were of good quality. There was a soft systolic murmur at the apex, not transmitted. There were no other murmurs. The blood pressure was 110 systolic, 70 diastolic.

Comment. This is a very interesting case of acute rheumatic fever that developed during pregnancy. The treatment was extremely conservative, the patient remaining in the hospital from the onset until after delivery, which was normal. The evidence of heart disease was minimal, and there were no periods of decompensation. At last note the patient's heart was well compensated and showed no evidence of serious damage.

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning February 9.

MIOOLESEX EAST

Tuesday, February 11, at 4:15 p.m. at the Melrose Hospital, Melrose. *Technic and Treatment of Primary, Secondary and Tertiary Syphilis.* Instructor: William P. Boardman. *Walter H. Flanders, Chairman.*

MIOOLESEX SOUTH

Tuesday, February 11, at 4:00 p.m., at the Cambridge Hospital, Mt. Auburn Street, Cambridge. *Chemotherapy in the Treatment of Gonococcal Infection.* Instructor: Oscar F. Cox. *Dudley Merrill, Chairman.*

NORFOLK

Thursday, February 13, at 8:30 p.m., at the Norwood Hospital, Norwood. *Recent Advances in Medical Therapeutics.* Instructor: Charles L. Short. *Hugo B. C. Riemer, Chairman.*

NORFOLK SOUTH

Monday, February 10, at 8:30 a.m., at the Quincy City Hospital, Quincy. *Pediatric Case Discussions.* Instructor: James M. Baty. *David L. Belding, Chairman.*

SUFFOLK

Thursday, February 13, at 4:30 p.m., in John Ware Hall, Boston Medical Library. *Acute Abdominal Pain.* Instructor: Stanley J. G. Nowak. *Reginald Fitz, Chairman.*

DEATHS

BUCKLEY—JAMES T. BUCKLEY, M.D., of Worcester, died January 24. He was in his sixty-fifth year. Dr. Buckley attended Williams College and received his degree from the Baltimore Medical College in 1902. He had been practicing in Worcester for over twenty years, and prior to that had practiced in Marlboro for about fifteen years.

He was a former member of the Massachusetts Medical Society and the American Medical Association.

His widow, two daughters and two sons survive him.

WEEKS—JOSHUA F. WEEKS, M.D., of New Bedford died January 12. He was in his seventy-fifth year.

Born in Dartmouth, he attended the University of the Green Mountains, Burlington, Vermont, and received his degree from the University of Vermont College of Medicine in 1890. He settled in New Bedford and began practice.

Dr. Weeks was a member of the Massachusetts Medical Society, the American Medical Association and the New Bedford Medical Society.

Two children survive him.

CORRESPONDENCE

TREATMENT OF PNEUMOCOCCAL PNEUMONIA

To the Editor: The Massachusetts Department of Public Health has recently revised its circular on the use of the specific drugs in the treatment of pneumonia. With this exception the pneumonia program of the department is the same as that of last year. The program includes:

The provision of concentrated therapeutic (horse) serums for Types 1, 2, 5, 7 and 8, obtainable for the treatment of patients with infections due to one of these types, as determined by an approved typing laboratory.

The provision of concentrated therapeutic (rabbit) serums for Types 4, 9, 14 and 18 on the basis indicated above.

The provision of concentrated therapeutic (rabbit) serums of all other types for patients with *bacteremia*, *meningitis* or *peritonitis* due to one of these types, the determination of which has been made by an approved typing laboratory.

A circular describing the use of sulfapyridine and sulfathiazole in treatment of pneumococcal pneumonia.

Revised case-report forms, supplied by the department, which must be completed and returned to the department for all serum-treated cases.

Receipt forms which must be signed by the physician receiving the serum and by the issuing agency.

The distribution of therapeutic horse serums will be continued as in previous years through typing laboratories. Therapeutic rabbit serums for Types 4, 9, 14 and 18 will be available through the five typing laboratories from which they were supplied last season. All other therapeutic rabbit serums will be available from only two points—the Bacteriological Laboratory at the State House, Boston, and the Westfield State Sanatorium at Westfield.

The rabbit serums are being purchased, and the amount of money available for this purpose may not suffice for all demands. Therefore, the continuation of this service will depend greatly on the conservation of funds effected through the prompt return of unused serum.

Copies of the new drug circular and the list of approved typing laboratories and serum stations are being mailed to all physicians in the State and are also available at the approved typing laboratories. Additional copies of the circular and the list of the laboratories at which the various serums may be obtained will be furnished by the department on request. They are reproduced below.

PAUL J. JAKMAUJ, M.D.,
Commissioner of Public Health.

State House,
Boston.

* * *

THE SULFONAMIDE DERIVATIVES, SULFAPYRIDINE AND SULFATHIAZOLE, IN THE TREATMENT OF PNEUMOCOCCAL PNEUMONIA

These drugs and antipneumococcal serum are of definite value in treating pneumococcal pneumonias. Sulfapyridine and sulfathiazole appear to be about equally effective and are superior to sulfanilamide. Sulfapyridine is superior to sulfathiazole in the treatment of pneumococcal meningitis.

1. Before starting treatment with drug or serum:

1. Obtain sputum for typing and blood for culture.

2. Make complete blood counts, including red and white cells, differential and hemoglobin determination.
3. Make complete urine examination; and, if indicated, blood nonprotein nitrogen determination.

(2 and 3, above, should be done daily while patient is receiving sulfapyridine or sulfathiazole in full doses, or if abnormalities are encountered; and every 2 to 3 days during entire period of drug administration.)

II. *General Considerations.* Because the drugs and the serum differ in their mode of action, neither is a complete substitute for the other. Sulfapyridine and sulfathiazole inhibit the multiplication of the pneumococcus, whereas specific serum furnishes additional antibodies which may be necessary for the destruction of the organisms. By combining drug and serum less of each may be needed than either would require alone. Unless one or the other is contraindicated, serum is recommended as a supplement to either sulfapyridine or sulfathiazole in the following situations:

1. Treatment is begun after the third day of the disease.
2. Patient is over 50 years old.
3. Patient is pregnant or in first week of puerperium.
4. Pneumococcus bacteremia is known to be present.
5. There is involvement of more than one lobe.
6. There is no obvious improvement within 18-24 hours after the initial dose of sulfapyridine or sulfathiazole; serum therapy may be delayed to 24-36 hours after the initial dose of the drug in the absence of 1-5 above.

III. *Contraindications to the Use of Sulfapyridine or Sulfathiazole.* Only under the most exceptional circumstances should sulfapyridine or sulfathiazole be given in the presence of either of the following conditions:

1. History of previous toxic reactions (anemia, agranulocytopenia, anuria, hematuria or hepatitis) to any of the *sulfonamide derivatives*.
2. Hemolytic anemia or granulocytopenia from any cause.

A difference of opinion exists as to the importance of previous drug rash, impaired kidney function or jaundice as a contraindication to sulfapyridine or sulfathiazole therapy; therefore the desirability of treating patients with these conditions is a matter of judgment. Great care must be exercised under these conditions, and the drug stopped at the first evidence that the functions are further impaired or if the drug rash recurs.

If a drug is to be given to postoperative patients, sulfathiazole is less likely than sulfapyridine to cause vomiting.

IV. *Dosage and Procedure of Treatment.* The rate and degree of absorption and excretion of sulfapyridine and sulfathiazole are variable, hence there can be no hard and fast rule of dosage. When oral administration is interfered with by vomiting or when it fails to give an adequate blood drug concentration,

Laboratories for Pneumococcus Typing and Serum Distribution

CITY OR TOWN	HOSPITAL OR OTHER AGENCY	SPECIMENS TYPED FOR TYPES 1, 2, 3, 4, 5, 7, 8, 9, 14 AND 18 (PLUS POOLS A-F), EXCEPT AS INDICATED	TYPE OF THERAPEUTIC SERUM FOR DISTRIBUTION	SPECIMENS ACCEPTED†
Amesbury	*Amesbury Hospital		None	A
Arlington	*Symmes Arlington Hospital		None	A
Ayer	Community Memorial Hospital	1-33	1	A
Beverly	Beverly Hospital	1-33	1, 2, 5, 7, 8	A
Boston	Amoxian and Vaccine Laboratory	No typing	1, 2, 5, 7, 8	No typing
	Beth Israel Hospital			
	Boston City Hospital	1-33	None	A
	*Carney Hospital		1	H
	Children's Hospital	1-33	None	S
	Faulkner Hospital	1-33	1, 2, 5, 7, 8	A
	*Long Island Hospital		None	H
	*Massachusetts General Hospital	1-33	1	S
	*Massachusetts Memorial Hospitals	1-33	None	A
	*New England Deaconess Hospital		None	A
	*New England Hospital for Women and Children	1-33	None	S
	Peter Bent Brigham Hospital	1-33	1, 2, 5, 7, 8	H
	STATF BACTERIOLOGICAL LABORATORY	1-33	All types	A
	*St. Elizabeth's Hospital	1-33	1	A
Brockton	Board of Health Laboratory	1-33	None	A
	Brockton Hospital	1-33	1, 2, 5, 7, 8	A
Cambridge	*Cambridge City Hospital		1	M
	Cambridge Hospital	1-33	1	A
Chelsea	Chelsea Memorial Hospital		1	H
Clinton	Clinton Hospital		1	A
Everett	*Windden Memorial Hospital	1-33	1	A
Fall River	Fall River General Hospital		1	A
	*St. Anne's Hospital		1	A
	*Truendale Hospital	1-33	1	A
	Union Hospital	1-33	1	A
Fitchburg	Rutland Hospital	1-33	1, 2, 5, 7, 8	A
Foxboro	Foxboro State Hospital		None	H
Frammingham	*Frammingham Union Hospital	1-33	1, 2, 5, 7, 8	A
Gardner	Henry Heywood Memorial Hospital		1	A
Gloicester	*Addison Gilbert Hospital	1-33	1	S
Great Barrington	*Fairview Hospital		1, 2, 5, 7, 8	A
Greenfield	Franklin County Hospital	1-33	1, 2, 4, 5, 7, 8, 9, 14, 18	A
Haverhill	Hale Hospital	1-33	1	A
Holyoke	Holyoke Hospital	1-33	1	A
	Providence Hospital	1-33	1, 2, 4, 5, 7, 8, 9, 14, 18	A
Hyannis	Cape Cod Hospital	1-33	1, 2, 5, 7, 8	A
Ipswich	Cable Memorial Hospital	1-33	None	A
Lawrence	Lawrence General Hospital	1-31	1	A
Leominster	*Leominster Hospital		1	M
Lowell	Lowell General Hospital		1	A
	St. John's Hospital	1-33	1	A
	St. Joseph's Hospital	1-33	1, 2, 5, 7, 8	A
Lynn	*Board of Health		None	M
	*Lynn Hospital	1-33	1, 2, 5, 7, 8	A
	*Union Hospital		1	A
Malden	Malden Hospital	1-33	1	A
Marlborough	*Marlborough Hospital		1	S
Melrose	Melrose Hospital		None	A
Middleborough	St. Luke's Hospital		1	A
Milford	Milford Hospital		1	A
Montague City	Farren Memorial Hospital	1-33	None	A
Nantucket	*Nantucket Cottage Hospital	1-33	1	A
Natick	*Leonard Morse Hospital		1	S
New Bedford	St. Luke's Hospital	1-33	1, 2, 4, 5, 7, 8, 9, 14, 18	A
Newburyport	*Anna Jacques Hospital		1	S
Newton	Newton Hospital	1-33	1	A
Norfolk	*Pondville State Hospital	1-33	1, 2, 5, 7, 8	A
North Adams	North Adams Hospital		1	A
Northampton	Cooley Dickinson Hospital	1-33	1	A
	*Northampton State Hospital		None	H
Norwood	*Norwood Hospital		1	A
Palmer	*Wing Memorial Hospital		None	A
Peabody	*Jonah B. Thomas Hospital		None	A
Pittsfield	House of Mercy Hospital	1-33	1, 2, 5, 7, 8	A
	*St. Luke's Hospital	1-33	1	A
Plymouth	*Jordan Hospital		1	A
Pocasset	*Barnstable County Sanatorium	1-33	1	A
Quincy	Quincy City Hospital	1-33	1, 2, 5, 7, 8	A
Salem	*Salem Hospital	1-33	1	A
Somerville	*Somerville Hospital		1	A
Southbridge	*Harrington Memorial Hospital		1, 2, 5, 7, 8	A
Springfield	Mersey Hospital	1-33	1	A
	Springfield Hospital	1-33	1	A
	Wesson Memorial Hospital	1-33	1	A
Taunton	Morton Hospital		None	H
	State Hospital		1	A
Tewksbury	State Infirmary	1-33	None	H
Walham	*Metropolitan State Hospital		None	A
	*Walham Hospital	1-33	1	A
Ware	*Mary Lane Hospital		1	A
Webster	*Webster District Hospital		1	A
Westfield	*Noble Hospital	1-33	None	A
	*WESTFIELD STATE SANATORIUM	No typing	All types	No typing
Weymouth	Weymouth Hospital		None	A
Winthrop	Winthrop Community Hospital		1	A
Worcester	Memorial Hospital	1-33	1	A
	St. Vincent Hospital	1-33	1	A
	Worcester City Hospital	1-33	1, 2, 4, 5, 7, 8, 9, 14, 18	A
	*Worcester Hahnemann Hospital		1	A
	Worcester State Hospital		None	A

*Approval pending, application made and evaluation of performance is in progress

†Specimens for typing accepted from S = staff members and hospital cases only, A = any physician; H = hospital cases only, M = any physician in municipality

Typings are done without charge at the State Bacteriological Laboratory, Boston. All other laboratories, except those maintained by municipalities, charge fees for typing. Special arrangements can be made for typings done on persons unable to pay when treated in the home.

resort may be had to the intravenous use of sodium sulfapyridine. Because of the danger of venous thrombosis and perivascular necrosis, the use of sodium sulfapyridine should be restricted to such cases. For details of its use, reference should be made to the manufacturers' circulars.

In general the following procedure for oral administration is at present recommended:

1. Dosage. (The drug is given orally and on schedule; the patient should be awakened if necessary to give drug.)

- a. Adults: 2 gm., followed in 4 hours with 1 or 2 gm., then 1 gm. every 4 hours until temperature, pulse and respiration are essentially normal for 48 hours; then 1 gm. every 6 hours for 2 to 3 days. From the standpoint of safety the drug should not be continued for longer than 96 hours unless daily blood drug-level determinations are being made.

- b. Infants and children: initial dose 0.25 gm. per 10 lb. body weight and maintenance dose 0.75 gm. per 10 lb. body weight per 24 hours administered in divided doses at 4 to 6-hour intervals.

- c. The giving of the drug in milk, fruit juice, gruel or applesauce may be helpful. For nausea, small doses of one of the milder sedatives or carminatives may be tried. It is well to remember that, with vomiting, there may be some loss of fluids and chlorides, as well as a loss of the drug, and infusions of saline subcutaneously or intravenously may be necessary to replace these losses.

2. Relapse or extension may occur if:

- a. The drug is discontinued too soon after a therapeutic response has been obtained, particularly in cases treated early in the course of the illness; or

- b. The pneumococcus causing the infection becomes resistant to the drug (sulfapyridine or sulfathiazole fast); if this occurs, further treatment with the drugs is of no avail and serum therapy is indicated.

3. The action of the drug may mask the symptoms of empyema or other surgical conditions, but does not lessen the need for surgical action in such conditions.

4. Blood drug-level estimations should be made after 12 to 18 hours of treatment and every 1 to 2 days thereafter; a level of 4 to 6 mg. of free drug per 100 cc. of blood is usually considered adequate, and a level of 15 mg. is probably the upper limit of safety.

V. Reactions from Sulfapyridine or Sulfathiazole.

1. Those reactions which require stopping the drug and, in some cases, active therapeutic measures are:

- a. Blood changes, which may include hemolytic (or other severe) anemia and granulocytopenia;

- b. Effects on the urinary system, which may include gross hematuria, ureteral pain,

urinary obstruction, nitrogen retention and nephritic edema;

- c. Toxic hepatitis, evidenced by jaundice.

2. Reactions which may require stopping the drug and institution of appropriate therapy are:

- a. Severe and persistent nausea and vomiting, particularly when associated with postoperative cases, loss of chlorides, etc. (See IV 1 c.);

- b. Drug fever, drug rashes; and

- c. Marked central-nervous-system disorders, including vertigo, headache and mental depression or excitement.

Reactions may be detected early or sometimes avoided if the precautions outlined in Sections 1, 2 and 3 and Section IV 4 are followed.

These recommendations have been approved by the Pneumonia Advisory Committee.

REPORT OF MEETING

WILLIAM HARVEY MEDICAL SOCIETY

A regular meeting of the William Harvey Medical Society of Tufts College Medical School was held at the Beth Israel Hospital on November 8, 1940, with Dr. William Dameshek presiding. Dr. Maxwell M. Wintrobe of Johns Hopkins Medical School spoke on "Experimental Studies on Pernicious Anemia, with Particular Reference to the Central-Nervous-System Manifestations."

In introduction the speaker reviewed the outstanding clinical, laboratory and historical data relative to pernicious anemia. The chief difficulty in the experimental production of the syndrome has been the inability consistently to produce in lower animals a picture similar to that of human beings. It has been found nearly impossible to devise an adequate diet lacking in extrinsic factor, and intrinsic factor has been demonstrated to exist in other parts of the gastrointestinal tract than the stomach.

Dr. Wintrobe's attack on the problem originated in the observation that the number of erythrocytes increases and the size decreases as one ascends the phylogenetic scale, as well as the embryologic scale, of mammals. Nucleation of erythrocytes occurs in the early mammalian fetus as well as in the phylogenetic scale below man. These features are similar to the changes that occur in pernicious anemia as the anemia is relieved by therapy. It was also found that fetal liver extracts were not potent in curing pernicious anemia. Because of these analogies with the condition found in pernicious anemia during relapse, it was decided to attempt to produce pernicious anemia in very young animals. Newborn pigs were used as the experimental animal because of their size and because this animal is a source of commercial liver extract.

Initially it was found that the basic experimental diets were deficient in the water-soluble vitamins, and yeast was consequently added. But this was found to contain blood-regenerating substances, and synthetic vitamin B products were therefore substituted when they became available. In a large group of pigs on this inadequate diet a few animals developed a macrocytic anemia; but all the animals developed marked ataxia. Pathologically the findings in the central nervous system resembled those of pernicious anemia except in lack of degeneration in the lateral funiculi.

A summary of the experiments of Dr Wintrobe revealed that animals on inadequate yeast intake were not protected from the development of ataxia by thiamin, riboflavin or nicotinic acid, singly or in any combination, yeast, even in huge doses, did not protect all the animals, although those which eventually became ataxic were carried on for long periods without ataxia, control experiments ruled out inanition as the cause of the nervous system changes, addition of whole liver completely protected the animals, wheat germ oil gave no protection. The effect of various liver fractions is now being investigated, and the indications are that the Cohn fraction is protective, whereas the Whipple fraction is not, recent observations indicate that protection is given by vitamin B₁₂, choline and pantothenic acid in combination, or possibly by one of these alone.

The relation of these experiments to pernicious anemia is still indirect and uncertain, Dr Wintrobe stated. However, it has been found that liver extracts made from ataxic pigs are ineffective in treating pernicious anemia, in contrast to those from pigs on adequate diets including liver or potent yeast. The puzzling question is, if the pigs' livers are lacking in the antipernicious anemia factor, why do these animals not develop macrocytic anemia?

Dr Wintrobe suggested that pernicious anemia may be a syndrome resulting from a deficiency of several factors, such as that found in pellagra. If this is so, the distribution of the factors in usual diets would explain why one person develops hematologic manifestations, another neurologic and another gastrointestinal. This is borne out clinically by the cases of severe anemia without symptoms in the central nervous system, and those with severe combined system disease and minimal macrocytic anemia.

During the discussion Dr Wintrobe answered questions posed by the audience. The amount of liver extract employed in his experiments was comparable to the human therapeutic dosage. Yeast is variable in its content of anti-anemic factors, depending on the mode of manufacture. The speaker cited the results of Strauss and Castle in obtaining a reticulocyte response by feeding yeast with gastric juice. Dr Wintrobe obtained similar results with large doses of yeast alone in those patients who were able to respond to oral therapy. The presence of achlorhydria was variable in controls and experimental animals. It appeared and disappeared from time to time and therefore was not considered significant. No consistent buccal mucosal changes were noted.

NOTICES

HARVARD MEDICAL SOCIETY

There will be a meeting of the Harvard Medical Society on Tuesday, February 11, in the amphitheater of the Peter Bent Brigham Hospital at 8 15 p.m. Dr Soma Weiss will preside.

PROGRAM

Presentation of cases
Pneumonia Dr Maxwell Finland

Beginning with the February 11 meeting, the Harvard Medical Society will meet on the second Tuesday of each month rather than bimonthly as in the past.

SOUTH END MEDICAL ASSOCIATION

There will be a meeting of the South End Medical Club at the headquarters of the Boston Tuberculosis Association,

554 Columbus Avenue, Boston, on Tuesday, February 18, at 12 m. Dr Frank R. Ober will speak on 'Chronic Arthritis'.

Physicians are cordially invited to attend.

BOSTON DOCTORS SYMPHONY ORCHESTRA



The Boston Doctors' Symphony Orchestra will rehearse under Alexander Thiede, formerly concert master of the Cleveland Symphony Orchestra, every Thursday at 8 30 p.m. Those interested in becoming members should com-

municate with Dr Julius Loman, Pelham Hall Hotel, Brookline (BEA 2430).

MASSACHUSETTS MEMORIAL HOSPITALS

There will be a research conference at the Robert Dawson Evans Memorial, 78 East Concord Street, Boston, on Wednesday, February 12, at 5 p.m. Dr Wilham E. Long will speak on 'Mapharsen in the Treatment of Forty Patients Following Arspenamine Dermatitis'.

Physicians and medical students are invited to attend.

SUFFOLK CENSORS MEETING

The censors of the Suffolk District Medical Society will meet for the examination of candidates at the Boston Medical Library, 8 Fenway, Boston, on Thursday, May 1, at 4 00 p.m.

Candidates should make personal application to the secretary and present their medical diplomas at least six weeks before examination (if graduates of foreign medical schools or schools not on the list recognized by the Council at least eight weeks before).

JOSEPH H PRATT DIAGNOSTIC HOSPITAL

Bennet Street, Boston
Lecture Hall, 9-10 a.m.

MEDICAL CONFERENCE PROGRAM, FEBRUARY

Tuesday, February 11—Blood Transfusion. Past, present and future. Dr H G Brugsch.

Wednesday, February 12—Hospital case presentation. Dr S J Thannhauser.

Thursday, February 13—Artificial Pneumoperitoneum. Dr O B Lewis.

Friday, February 14—Certain Aspects of Leukemia. Dr Henry Jackson, Jr.

Saturday, February 15—Hospital case presentation. Dr S J Thannhauser.

Tuesday, February 18—The Psychosomatic Problem. Its significance for the physician. Dr Kurt Goldstein.

Wednesday, February 19—Hospital case presentation. Dr S J Thannhauser.

Thursday, February 20—The Perennial Tonsil Problem. Dr W A MacColl.

Friday, February 21—Some Characteristics of Experimental Deficiency Diseases. Dr O A Bessey.

Tuesday, February 25—X-ray demonstration. Dr Alice Ettinger.

Wednesday, February 26—Hospital case presentation. Dr. S. J. Thannhauser.
 Thursday, February 27—Advances in chemotherapy. Dr. C. A. Janeway.
 Friday, February 28—Gastrointestinal clinic. Dr. K. S. Andrews.

NEW ENGLAND HEART ASSOCIATION

The next meeting of the New England Heart Association will be held at the Beth Israel Hospital on Monday, February 24, at 8:15 p.m.

PROGRAM

- Demonstration of a Method Useful in Teaching Electrocardiograph. Dr. J. E. F. Riseman.
- The Incidence and Location of Occlusions in the Various Coronary Arteries. Dr. M. J. Schlesinger.
- Postoperative Thrombophlebitis: Factors impeding circulation and changes in venous pressure during abdominal operations. Drs. David Davis and Samuel Gilman.
- Cardiovascular Dynamics in Patients with Superior Caval Obstruction. Dr. M. D. Altschule.
- An Unusual Problem in Differential Diagnosis: With x-ray demonstration. Drs. Karl Presser and S. A. Robins.
- Further Studies in the Appraisal of Therapeutic Measures for Angina Pectoris. Dr. A. S. Freedberg.
- The Relation Between Electrocardiographic Changes and Coronary Artery Pathology. Drs. P. M. Zoll and Erwin Spiegl.

Interested physicians and medical students are cordially invited to attend.

NEW ENGLAND DERMATOLOGICAL SOCIETY

The next regular meeting of the New England Dermatological Society, which was scheduled for February 12 at the Massachusetts General Hospital, has been canceled because of the proximity of the Atlantic Dermatologic Conference to be held on March 22.

NEW ENGLAND SOCIETY OF PHYSICAL MEDICINE

There will be a meeting of the New England Society of Physical Medicine at the Hotel Kenmore, Boston, on Wednesday, February 19, at 8:00 p.m. A business meeting at 6:00 p.m. will be followed by an informal dinner in the Empire Room at 6:30 p.m.

PROGRAM

Medical Preparedness. Dr. Walter G. Phippen, president, Massachusetts Medical Society.

All members of the medical profession are cordially invited to attend.

AMERICAN BOARD OF OBSTETRICS AND GYNECOLOGY

The general oral and pathological examinations (Part II) for all candidates (Groups A and B) will be conducted at Cleveland, Ohio, by the entire board from Wednesday, May 28, to Monday, June 2, inclusive, prior to the opening of the annual meeting of the American Medical Association.

Application for admission to Group A, Part II, exam-

inations must be on file in the secretary's office not later than March 1.

Formal notice of the time and place of these examinations will be sent each candidate several weeks in advance of the examination dates.

Candidates for re-examination in Part II must make written application to the secretary's office before April 15, 1941.

In accordance with the previously announced plans of the board, the examinations to be given for the board's fiscal year 1941-42 (ending with the Part II examination in June, 1942) will be the last for candidates under Group A and B classifications. Applications must be in the secretary's office at least ninety days in advance of the announced examination dates, which dates are published in the various medical journals. Following the close of the final date for receipt of Group B applications (October, 1941) and Group A applications (March, 1942) all candidates will be considered in one classification by the board thus doing away with the junior and senior groups for examination, and all candidates will be required to take the Part I examination (written paper and submission of case histories) as well as the Part II examination (oral and pathological).

Military service will not affect the eligibility of any candidate so far as the board requirements regarding limitation of practice are concerned. Military service will under no circumstances be considered as an infringement of any regulations outlined in this board's booklet.

The board requests that all prospective candidates who plan to submit applications in the near future request and use the new application form which has been inaugurated by the board this year. The secretary will be glad to furnish these forms on request, together with information regarding board requirements. Address: Dr. Paul Titus, Secretary, 1015 Highland Building, Pittsburgh (6), Pennsylvania.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, FEBRUARY 9

SUNDAY, FEBRUARY 9

- 14 p.m. Medical Problems Presented by Selective Service. Dr. Frederick F. Russell. Free public lecture. Harvard Medical School, Building D.
- 14 p.m. Immunization Against Contagious Diseases. Dr. Charles F. Walcott. Cambridge Hospital, Margaret Jewett Hall.

MONDAY, FEBRUARY 10

- 12:15-1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.

TUESDAY, FEBRUARY 11

- *9-10 a.m. Blood Transfusion: Past, present and future. Dr. H. G. Brugsch. Joseph H. Pratt Diagnostic Hospital.
- 12:15-1:15 p.m. Clinicorontogenological conference. Peter Bent Brigham Hospital amphitheater.
- 8 p.m. Boston City Hospital, Dowling Surgical Building. New England Society of Anesthesiology.
- *7:45 p.m. The Present Status of Physiotherapy in the Treatment of Chronic Arthritis. Dr. Arthur L. Watkins. Robert Breck Brigham Hospital.
- 8:15 p.m. Harvard Medical Society. Amphitheater, Peter Bent Brigham Hospital.

WEDNESDAY, FEBRUARY 12

- *9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.
- *12 m. Clinicopathological conference. Children's Hospital.
- *2-4 p.m. Obesity. Drs. J. C. Aub and F. C. Newton. Peter Bent Brigham Hospital.
- *5 p.m. Mapharsen in the Treatment of Forty Patients Following Arspenamine Dermatitis. Dr. William E. Long. Massachusetts Memorial Hospitals.

THURSDAY FEBRUARY 13

*8:30 a.m. Combined clinic of the medical surgical orthopedic and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital at the Peter Bent Brigham Hospital

*9-10 a.m. Artificial Pneumoperitoneum Dr O B Lewis Joseph H Pratt Diagnostic Hospital

*8:15 p.m. Alcoholism Dr Merrill Moore United States Naval Hospital Chelsea

FRIDAY FEBRUARY 14

*9-10 a.m. Certain Aspects of Leukemia Dr Henry Jackson Jr Joseph H Pratt Diagnostic Hospital

SATURDAY FEBRUARY 15

*9-10 a.m. Hospital case presentation Dr S J Thannhauser Joseph H Pratt Diagnostic Hospital

*Open to the medical profession
†Open to the public

FEBRUARY 11-25—Joseph H Pratt Diagnostic Hospital medical conference program Page 261

FEBRUARY 13—Pentucket Association of Physicians Page 263 issue of August 15

FEBRUARY 18—South End Medical Club Page 261

FEBRUARY 19—Boston Society of Biologists Page 218 issue of January 30

FEBRUARY 19—New England Society of Physical Medicine Page 262

FEBRUARY 20-22—American Orthopsychiatric Association Inc Page 999 issue of December 12

FEBRUARY 24—New England Heart Association Page 262

MARCH 8—American Board of Ophthalmology Page 201 issue of August 1

MARCH 12-14—New England Hospital Assembly Hotel Statler Boston
MARCH 21-22—New York University College of Medicine Alumni Day Page 135 issue of January 16

APRIL 21-25—American College of Physicians Page 1065 issue of June 30

MAY 21-22—Massachusetts Medical Society Boston

MAY 28-JUNE 2—American Board of Obstetrics and Gynecology Page 26*

JUNE 2-6—American Medical Association Cleveland Ohio

OCTOBER 14-17—American Public Health Association Page 135 issue of January 16

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

MARCH 5—Lecture in Heart Disease Dr Merrill C Sisman Essex Sanatorium Middleton

APRIL 2—Pediatric Problems in General Practice Dr Joseph Garland Add-on Gilbert Hospital Gloucester

MAY 14—Relation of the Doctor to the Law Mr Leland Powers New Ocean House Swampscott

FRANKLIN

MARCH 11

MAY 13

Meetings will be held at 11 a.m. at the Franklin County Hospital Greenfield

NORFOLK

FEBRUARY 25—Medical college meeting 8:30 p.m. Hotel Puritan Boston

MARCH 25—To be announced

MAY 8—Censors meeting Hotel Puritan

SUFFOLK

APRIL 30—Page 604 issue of October 10

MAY 1—Censors meeting Page 261

WORCESTER

FEBRUARY 12—Worcester State Hospital Worcester

MARCH 12—Memorial Hospital Worcester

APRIL 9—Hahnemann Hospital Worcester

Supper at 6:30 p.m. followed by a business meeting and scientific program

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information

in regard to all listed books will be gladly furnished on request.

Photodynamic Action and Diseases Caused by Light By Harold Francis Blum, Ph.D. The Washington Biophysical Institute 8°, cloth, 309 pp., with 25 tables and 50 illustrations New York Reinhold Publishing Corporation, 1941 \$6.00

The Role of the Liver in Surgery By Frederick Fitzhbert Boyce, M.D., visiting surgeon, Charity Hospital of Louisiana at New Orleans, French Hospital, Mercy Hospital, Hotel Dieu, Southern Baptist Hospital and Touro Infirmary 4°, cloth, 365 pp., with 44 illustrations Springfield, Illinois Charles C. Thomas, 1941 \$5.00

A History of Medicine By Arturo Castiglioni, M.D., research associate in the history of medicine, Yale University Translated from the Italian and edited by E. B. Krumbhaar, M.D., Ph.D., honorary president of the American Association of the History of Medicine 8°, cloth, 1013 pp., with 443 illustrations New York Alfred A. Knopf, 1941 \$8.50

What Are the Vitamins? By Walter H. Eddy, Ph.D., director of Good Housekeeping Bureau, and professor of physiological chemistry, Teachers College, Columbia University 8°, cloth, 247 pp. New York Reinhold Publishing Corporation, 1941 \$2.50

Modern Drug Encyclopedia and Therapeutic Guide By Jacob Guttman, M.D., Ph.D., director, Brooklyn Diagnostic Institute, and consulting physician, Manhattan General Hospital, New York City, and the Riverdale, Shore Road, Williamsburg Maternity and Borough Park General hospitals, Brooklyn Second edition 8°, cloth, 1644 pp. New York New Modern Drugs, 1941 \$7.00

Bacteriology in Neuropsychiatry A survey of investigations concerned with the specific role of infections and immune processes By Nicholas Kopeloff, Ph.D., research bacteriologist, New York State Psychiatric Institute and Hospital, New York City 8°, cloth, 316 pp., with 11 tables Springfield, Illinois Charles C. Thomas, 1941 \$4.50

Food, Teeth and Larceny By Charles A. Levinson, D.M.D. 8°, cloth, 232 pp. New York Greenberg, 1940 \$3.00

A Textbook of Clinical Neurology By J. M. Nielsen, M.D., associate clinical professor of medicine (neurology), University of Southern California, senior attending physician (neurology), Los Angeles County General Hospital, and attending neurologist, Hospital of the Good Samaritan, Los Angeles 4°, cloth, 672 pp., with 179 illustrations New York Paul B. Hoeber, Incorporated, 1941 \$6.50

The Extra Ocular Muscles A clinical study of normal and abnormal ocular motility By Luther C. Peter, M.D., Sc.D., LL.D., professor emeritus of diseases of the eye, Graduate School of Medicine, University of Pennsylvania, member of consulting staff, Graduate Hospital, University of Pennsylvania, and consulting ophthalmologist, Rush Hospital for Consumption and Allied Diseases, Friends' Hospital for Nervous and Mental Diseases and Roxborough Memorial Hospital Third edition, thoroughly revised 8°, cloth, 368 pp., with 147 illustrations and 5 colored plates Philadelphia Lea and Febiger, 1941 \$4.50

Diseases of the Digestive System Edited by Sidney A. Portus, M.D., associate clinical professor of medicine, Rush Medical College, University of Chicago, attending physician, Michael Reese Hospital, and consulting physician, Cook County Hospital, Chicago 8°, cloth, 952 pp., with

176 illustrations and 37 tables. Philadelphia: Lea and Febiger, 1941. \$10.00.

Medicine and Health in New Zealand: A retrospect and a prospect. By Douglas Robb, M.D., Ch.M., F.R.C.S. (Eng.). 8°, cloth, 146 pp. Auckland, New Zealand: Whitcombe and Tombs, Limited, 1940. 8/6.

Studies on the Human Thyroid in Iceland. By Julius Sigurjónsson. 8°, paper, 130 pp., with 21 tables and 10 figures. Reykjavik: Prentsmidjan Edda H. F., 1940. 6s. Obtainable from H. K. Lewis and Company, Limited, London.

Plague on Us. By Geddes Smith, M.D. 8°, 365 pp., with 24 illustrations. New York: The Commonwealth Fund, 1941. \$3.00.

Strange Malady: The story of allergy. By Warren T. Vaughan, M.D. 8°, cloth, 268 pp., with 23 illustrations. New York: Doubleday, Doran and Company, Incorporated, 1941. \$3.00.

Radiologic Physics. By Charles Weyl, B.S., M.S.; S. Reid Warren, Jr., B.S., Sc.D.; and Dallett B. O'Neill—Moore School X-Ray Laboratory, Moore School of Electric Engineering, University of Pennsylvania. With a foreword by Eugene P. Pendergrass, M.D., director of the Department of Radiology, University of Pennsylvania. 8°, cloth, 460 pp., with 166 illustrations and 33 tables. Springfield, Illinois: Charles C Thomas, 1941. \$5.50.

The Medical Reports of John Y. Bassett, M.D. The Alabama Student. With an introduction by Daniel C. Elkin, M.D., Joseph B. Whitehead Professor of Surgery, Emory University. 12°, cloth, 62 pp., illustrated. Springfield, Illinois: Charles C Thomas, 1940. \$1.50.

A Textbook of Clinical Pathology. Edited by Roy R. Kracke, M.D., professor of pathology and bacteriology, Emory University; and Francis P. Parker, M.D., assistant professor of pathology and bacteriology, Emory University. Second edition. 8°, cloth, 780 pp., with 223 illustrations, 26 tables and 34 colored plates. Baltimore: Williams and Wilkins Company, 1940. \$6.00.

BOOK REVIEWS

Sex in Marriage. By Ernest R. Groves, B.D., and Gladys Hoagland Groves. 12°, cloth, 250 pp. New York: Emerson Books, Inc. \$2.00.

With characteristic frankness and in a pleasing style the Groveses have made an addition to what is now becoming a small library by these authors on the subject of family adjustments. The reader who is acquainted with their previous writings will find nothing particularly new in attitude or style of presentation. Those who have read a number of the present-day frank studies in sex will find in this book little new information and nothing that tends to stimulate erotic interest. It does not deal with descriptions of deviations so much sought after by the curious minded. It is a book that could be put into the library of any home and should be available to the adolescent and young adult when parents desire to create a wholesome and factual attitude toward sex.

The reviewer does not wish to create the impression that this is a book far from that. There are ten chapters. The book deals with sex in its relation to happiness and marriage. It is a plea for an understanding of the rights and responsibilities of the individual in the family. It upholds the value of the family as a unit. It is a book for the young and the old. It is a book for the man and the woman. It is a book for the individual and the community. It is a book for the present and the future.

ing one's own background in making marriage adjustments, and this is followed by an interesting and practical statement regarding emotional problems arising from courtship.

The chapter on "Sex Equipment" is good, but its value would have been increased tenfold by the use of descriptive charts. To the visual minded nothing can take the place of pictures in the comprehension of physical structure and functioning.

In the chapter "The Beginnings of Marriage" there is a weakness that probably lies in the authors' withdrawal from any consideration of emotional deviations. It is too big a problem to discuss in a review, and if not fully considered, analysis might be unfair to the authors. The reviewer is constrained, however, to make the point that there is an error in the assumption that "cave-man tactics" are always disagreeable to the woman. There is a failure here to recognize that there are many women whose masochistic response to this somewhat sadistic approach is altogether satisfying. It seems a mistake to assume that such women are not normal. There is too great a tendency on the part of all authors to assume that those things with which they disagree and toward which they have a personal distaste are not normal, and that normality can be measured only by their own standards.

The subsequent chapters are interesting and instructive. On the whole it is a book that one need have no hesitancy in recommending to those who seek enlightenment on this subject.

Physical Diagnosis. By Ralph H. Major, M.D. Second edition, revised. 8°, cloth, 464 pp., with 437 illustrations. Philadelphia and London: W. B. Saunders Company, 1940. \$5.00.

The second edition of Dr. Major's textbook is even more attractive than the first. Its lively style, its wealth of historical allusions and its quotations from original and classic sources hold the reader's interest. The author is not afraid to append lists of bibliographic references to his chapters. A number of inaccuracies that marred the first edition have been corrected. The illustrations are abundant and good. The caption under Figure 373 on page 357, "Trophic changes in fingernails in pernicious anemia," should in the interest of accuracy be altered to "Spoon nails in anemia due to iron deficiency."

The March of Medicine. Edited by the Committee on Lectures to the Laity of the New York Academy of Medicine. 8°, cloth, 168 pp. New York: Columbia University Press, 1940. \$2.00.

Recently the laity has shown much interest in the history of medicine, and the New York Academy of Medicine has been foremost in fostering this trend. The book is the fourth in the series, "Lectures to the Laity." The contributors, eminent in the field they have chosen to discuss, are Drs. Walter C. Alvarez, Sanford V. Larkey, Cecil K. Drinker, Charles G. Heyd, R. G. Hoskins and Karl A. Menninger. The preface is written by Dr. Malcolm Goodridge, president of the New York Academy of Medicine, who emphasizes the thesis, "Without the intelligent co-operation of the lay people, the full application of the advance in medical science will never be possible." The topics that make up these lectures are as follows: "From Folkways to Modern Medicine," "Health in Elizabethan England," "Not So Long Ago," "The Romance of Modern Surgery," "The Story of Insanity," and "The Cinderella of Medicine." This book may be read with equal interest and instruction by the layman, the medical student and the physician.

The New England Journal of Medicine

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VOLUME 224

FEBRUARY 13, 1941

NUMBER 7

STUDIES ON HEMOGLOBIN REGENERATION IN PATIENTS WITH VITAMIN C DEFICIENCY¹

EUGENE L. LOZNER, M.D.†

BOSTON

IN 1930, Mettler, Minot and Townsend¹ observed the occurrence of anemia in nine patients with clinical signs of scurvy, which was relieved by fruit, green vegetables and fresh liver, but in two cases was unrelieved by either iron or liver extract of the type effective in pernicious anemia. The remission of the anemia was attributed to the richness of these foods in vitamin C, and the conclusion was drawn that a specific anemia due to vitamin C deficiency probably existed. The subsequent isolation, crystallization and synthesis of vitamin C, the development of methods for its estimation and the realization that foods rich in vitamin C may be sources of iron, vitamin A and vitamin B complex, made it desirable that this concept be investigated further.

The available data in the literature are difficult to evaluate because of the lack of a control period in most cases, and because many observers have used orange juice rather than pure ascorbic acid. All the reported cases treated with orange juice showed beneficial effects on the anemia. In this category belong the clinical and experimental data of Mettler, Minot and Townsend,¹ Mettler and Chew,² Parsons and Hawksley³ and Jennings and Glazebrook.⁴ Besides vitamin C, orange juice is known to contain iron and vitamin A and vitamin B complex.⁵ The suggestion has already been made that it may be necessary to explain the anemia of scurvy on the basis of deficiency of factors other than ascorbic acid.⁶

The data with respect to the effects of ascorbic acid are far less conclusive. Kenney and Rapoport⁷ treated 5 anemic infants with scurvy. In none was there any control period. The anemia of 2 of the infants improved during vitamin C

therapy alone. In the remaining 3, however, no improvement took place until iron was administered. Vaughan⁸ has reported a scorbutic patient in whom it was apparently necessary to administer ascorbic acid to control the anemia. The peak of reticulocytosis occurred, however, on the third day following ascorbic acid administration, which makes one speculate as to whether this was too soon for a true causative relation. Croft and Snorf⁹ could find no correlation between anemia and low vitamin C levels, nor did they get any reticulocytosis in 6 cases with "secondary anemia" and very low vitamin C levels by using synthetic vitamin C. Aron¹⁰ reported the failure of response of the anemia of experimental scurvy to ascorbic acid administration but noted its successful treatment with germinated oats. Three cases of scurvy with anemia observed by Ungley¹⁰ showed reticulocytosis and hemoglobin regeneration on a vitamin C free diet; a specific effect due to ascorbic acid administration could not be demonstrated. Dunlop and Scarborough¹¹ reported observations on 2 adults with scurvy in whom ascorbic acid apparently facilitated hemoglobin regeneration but produced no reticulocytosis.

The sporadic occurrence of a reticulocytosis without hemoglobin regeneration following ascorbic acid administration has been reported by Faulkner¹² and by Hall, Darling and Taylor.¹³ Two of the scorbutic infants of Kenney and Rapoport⁷ presented this phenomenon.

Indirect evidence bearing on this problem is presented by the work of Moore et al.¹⁴ on the relation between serum iron and ascorbic acid levels. They have shown that administration of iron results in a decrease in plasma ascorbic acid concentration. The converse, however, is not true, and ascorbic acid administration has no apparent effect on serum iron levels.

It is therefore evident that the existing data concerning the necessity of ascorbic acid for the

¹From the Thorek Memorial Laboratory, Second and Fourth Medical Services (Harvard), Boston City Hospital, and the Department of Medicine, Harvard Medical School.

The expenses of this paper were defrayed in part by a grant given in honor of Francis Weld Peabody by the Ella Sachs Plotz Foundation.

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regeneration of hemoglobin are largely inconclusive. It is the purpose of this communication to report observations concerning hemoglobin regeneration in 5 patients with presumptive vitamin C deficiency and anemia, with particular reference to the necessity for ascorbic acid administration.

METHODS

Five patients with presumptive vitamin C deficiency, as shown by complete chemical absence of reduced ascorbic acid from the blood plasma, were treated with bedrest and a diet limited to the following foods: whites of eggs, white bread, white soda crackers, butter, spaghetti, rice, bacon, corn syrup, tea, coffee and milk boiled for five minutes. None of these foods contain more than a trace of vitamin C or of vitamin B complex.

Three of the patients presented the clinical picture of scurvy, one pellagra, and the fifth idiopathic hypochromic anemia. All showed complete absence of reduced ascorbic acid from the blood plasma. Three patients had a moderate anemia, and in the others a mild anemia was rendered more severe by removal by venesection of 1600 cc. of blood.

Counts of the red and white cells, hematocrit determinations and hemoglobin estimations by a modification of the Klett-Summerson photoelectric-cell method¹⁵ were made on venous blood every other day. Reticulocyte percentages were determined on capillary blood every day. Determinations of the plasma ascorbic acid by the methods of Mindlin and Butler¹⁶ revised for the Klett-Summerson photoelectric colorimeter were made twice a week.

Abstracts of the case histories are as follows:

CASE 1. A 49-year-old unemployed white man, who had lived alone and cooked his own meals for the last 3 years, subsisting on a diet markedly deficient in fruits and green vegetables, three weeks before admission developed ecchymoses over both legs and swollen, spongy, purple, protruding, painful gums that bled easily. Six years before entry, a diagnosis of tertiary syphilis had been made, and he had been given intensive specific therapy. There was no history of alcoholism. The tourniquet test was positive. Urine and stool examinations were negative. Gastric analysis showed normal acidity. A diagnosis of scurvy was made.

CASE 2. A 55-year-old widower, who following the death of his wife lived alone for nine years, cooking his own meals and subsisting on a diet markedly deficient in fruits and green vegetables, seven weeks before admission developed large ecchymoses over both legs; three weeks later his gums became swollen and spongy and bled on the slightest trauma. There was no history of alcoholism. The tourniquet test was positive. Urine and stool examinations were negative. A blood Hinton test was positive. A diagnosis of scurvy was made.

CASE 3. A 67-year-old white man with a 20-year history of postprandial distress and occasional tarry stools un-

relieved permanently by appendectomy 20 years and gastroenterostomy 14 years previously, had subsisted for 5 years prior to entry on tea, white bread, milk, cream and coffee. Three months before admission he began to develop ecchymoses over both legs, and the postprandial distress recurred. The tourniquet test was positive. Urine examination was negative. A blood Hinton test was negative. Stool examination was markedly positive for occult blood. Gastric analysis showed normal acidity. X-ray examination of the stomach showed a small gastric ulcer and pyloric obstruction. Diagnoses of scurvy, gastric ulcer and pyloric obstruction were made.

CASE 4. A 49-year-old single laborer for 2 years had consumed between a pint and a quart of whiskey daily and had eaten irregularly and inadequately. Two weeks before admission, following exposure to the sun, the backs of both his hands became red, swollen, painful and blistered. The tourniquet test was positive. The urine and stool examinations were negative. A blood Hinton test was negative. Diagnoses of alcoholic pellagra and subclinical scurvy were made.

CASE 5. A 50-year-old housewife, subsisting on a diet slightly deficient in fruits and vegetables, complained of dysphagia of 5 years' duration and dysuria and dyspnea of 1 year's duration. She had had nine pregnancies. A marked hypochromic anemia was present. Examinations of the urine showed mild pyuria and bacilluria (colon bacillus). Stool examination was negative. A blood Hinton test was negative. Gastric analysis showed achylia. Diagnoses of chronic cystitis and idiopathic hypochromic anemia were made.

RESULTS

A summary of the results is presented in Table 1. It will be observed that 4 of the 5 patients showed satisfactory hemoglobin regeneration without vitamin C administration, even though they were kept on a diet containing only traces of vitamin C and vitamin B complex. In 3 of these 4 patients, ascorbic acid, administered after the initial period of hemoglobin regeneration, neither caused reticulocytosis nor increased the speed of hemoglobin increase. The remaining patient had clinical scurvy associated with melena and anemia. During the control period, neither the melena nor the anemia disappeared. Coincident with the administration of vitamin C, the melena ceased, and reticulocytosis and hemoglobin regeneration ensued.

It is also of interest to note that in 2 patients (Cases 2 and 5) complete regeneration of hemoglobin did not occur until after they were placed on yeast and a general diet.

DISCUSSION

The observations reported here confirm those of Ungley¹⁰ and support the suggestion of Croft and Snorf that it is possible that synthetic vitamin C is not the antianemic factor in scorbutic anemia, and that the universal success with orange juice may be attributed to a factor other than reduced ascorbic acid. Since orange juice contains vitamin B

complex, it is conceivable that one of the anti-anemic factors shown by Wills and Evans,¹⁷ Miller and Rhoads,¹⁸ and others,^{19, 20} to be concerned in various experimental anemias may also be concerned in the anemia of scurvy. This speculation is particularly inviting because of the original report of Mettier, Minot and Townsend¹ that liver extract was not effective, whereas raw liver pulp was, which is exactly what Wills has found in tropical macrocytic anemia.

Crandon and Lund²¹ have recently reported studies on a normal active adult on a vitamin C free diet receiving supplements of iron and every known vitamin except vitamin C for four months. During this period, despite blood loss of 2300 cc. by venesection for experimental reasons, the hemoglobin and red-cell count fell only slightly below their initial values and were quickly restored to normal levels by the ingestion of ferrous sulfate. During two additional months on the vitamin C free diet,²² manifest scurvy developed, but in spite of blood loss by venesection of 2400 cc. more, neither the hemoglobin nor the red-cell count fell. Thus, in a normal man on a vitamin C free diet for six months, during which manifest scurvy developed, and in spite of blood loss by venesection totaling 4700 cc., no anemia developed. This is confirmatory of the conclusions drawn here.

It is necessary to comment on the significance of the chemical absence of ascorbic acid from the plasma, which has been taken here as presumptive evidence of considerable deficiency of this factor. This is in agreement with most authorities.²³ It must be borne in mind, however, that the absence of ascorbic acid from the plasma implies complete absence from neither the blood nor the tissues. This is clearly demonstrated by the recent work of Butler and Cushman.²⁴ It is therefore conceivable that the anemia that has been described as due to vitamin C deficiency may not occur until the body is completely depleted of this vitamin.

The role of blood loss in the development of the anemia accompanying scurvy is unsettled. Two facts seem to point to its significance. The first is that scurvy is essentially a hemorrhagic disorder and, in common with analogous conditions, might be expected to be accompanied by an iron-deficiency anemia. The other is the reticulocytosis that many patients with scurvy present on admission to the hospital. This phenomenon has been observed by Ungley¹⁰ and Dunlop and Scarborough¹¹ and was presented by Cases 1 and 3 reported here. Added evidence that blood loss may be significant in the anemia accompanying scurvy is offered by Case 3. This patient had melena,

which did not cease until ascorbic acid was administered; coincident with the cessation of blood loss, hemoglobin regeneration occurred.

SUMMARY AND CONCLUSIONS

Observations on regeneration of hemoglobin were made in 5 patients with moderate anemia and with presumptive vitamin C deficiency, as indicated by total absence of reduced ascorbic acid from the plasma. In 4 patients regeneration of hemoglobin took place spontaneously or in response to iron therapy alone. It is concluded that hemoglobin regeneration may occur in the absence of reduced ascorbic acid from the blood by chemical test.

REFERENCES

- 1 Mettier, S. R., Minot, G. R. and Townsend, W. C. Scurvy in adults especially the effect of food rich in vitamin C on blood formation. *J. A. M. A.* 95:1089 1093, 1930.
- 2 Mettier, S. R. and Chew, W. B. The anemia of scurvy effect of vitamin C diet on blood formation in experimental scurvy of guinea pigs. *J. Exper. Med.* 55:971 979, 1932.
- 3 Parsons, L. G. and Hawksley, J. C. The anhaematopoietic anaemias (deficiency diseases of the erythron) nutritional anaemia and the anaemias of prematurity, scurvy and coeliac disease. *Arch. Dis. Child.* 8:117 144, 1933.
- 4 Jennings, G. H. and Glazebrook, A. J. A comparison of clinical and blood pictures in adult scurvy. *Brit. M. J.* 2:784 789, 1938.
- 5 Fixson, M. A. B. and Roscoe, M. H. Tables of the vitamin content of human and animal foods. *Nutrition Abstracts & Revs.* 7:823 867, 1938.
- 6 Croft, J. D. and Snorf, L. D. Cerebric acid deficiency frequency in a group of 100 unselected patients. *Am. J. M. Sc.* 198:403 408, 1939.
- 7 Kenney, A. S. and Rapoport, M. Studies in the use of crystalline vitamin C (ascorbic acid) in the prophylaxis and treatment of infantile scurvy and some other disorders of infancy and childhood. *J. Pediatr.* 14:161 182, 1939.
- 8 Vaughan, J. M. The haemopoietic response to therapy in non-tropical anaemias. *Tr. Roy. Soc. Trop. Med. & Hyg.* 27:533 544, 1934.
- 9 Aron, H. C. S. The relation of vitamin C deficiency to nutritional anemia. *J. Nutrition* 18:375 383, 1939.
- 10 Ungley, C. C. Some deficiencies of nutrition and their relation to disease. *Lancet* 1:875 882, 925 932, 1938.
- 11 Dunlop, D. M. and Scarborough, H. The specific effect of ascorbic acid on the anemia of scurvy. *Edinburgh M. J.* 42:476 482, 1935.
- 12 Faulkner, J. M. The effect of administration of vitamin C on the reticulocytes in certain infectious diseases preliminary report. *New Eng. J. Med.* 213:19, 1935.
- 13 Hall, M. G., Durling, R. C. and Taylor, F. H. L. The vitamin C requirement in rheumatoid arthritis. *Ann. Int. Med.* 13:415 423, 1936.
- 14 Moore, C. V., Bierman, H. R., Minnich, V. and Arrowsmith, W. F. Studies in Iron Absorption with Special Reference to the Relationship of Iron Metabolism to Ascorbic Acid. 14 pp. Reprint from Publication No. 13 of the American Association for the Advancement of Science, 1940.
- 15 Summerson, W. H. A simplified test tube photoelectric colorimeter and the use of the photoelectric colorimeter in colorimetric analysis. *J. Biol. Chem.* 130:149 166, 1939.
- 16 Mindlin, R. L. and Butler, A. M. The determination of ascorbic acid in plasma by a micro-method and micromethod. *J. Biol. Chem.* 122:673 686, 1938.
- 17 Wills, L. and Evans, B. D. F. Tropical macrocytic anaemia its relation to pernicious anaemia. *Lancet* 2:416 421, 1938.
- 18 Miller, D. K. and Rhoads, C. P. The experimental production in dogs of acute stomatitis, associated with leucopenia and a maturational defect of the myeloid elements of the bone marrow. *J. Exper. Med.* 61:173 182, 1935.
- 19 Wintrobe, M. M., Samter, M. and Lisco, H. Morphologic changes in the blood of pigs associated with deficiency of water soluble vitamin and other substances contained in yeast. *Bull. Johns Hopkins Hosp.* 64:399 423, 1939.
- 20 Fouts, P. J., Helmer, O. M. and Lepkovsky, S. Cure of microcytic hypochromic anemia in dogs with crystalline "factor I". *Proc. Soc. Exper. Biol. & Med.* 40:4, 1939.
- 21 Crandon, J. H. and Lund, C. C. Vitamin C deficiency in an otherwise normal adult. *New Eng. J. Med.* 222:748 752, 1940.
- 22 Crandon, J. H., Lund, C. C. and Dill, D. B. Experimental human scurvy. *New Eng. J. Med.* 223:353 369, 1940.
- 23 Wright, I. S. Cerebric acid (ascorbic acid crystalline vitamin C) a critical analysis of its use in clinical medicine. *Ann. Int. Med.* 12:516 528, 1938.
- 24 Butler, A. M. and Cushman, M. Distribution of ascorbic acid in the blood and its nutritional significance. *J. Clin. Investigation* 19:459 467, 1940.

SULFANILAMIDE IN THE TREATMENT OF ACUTE PELVIC INFLAMMATORY DISEASE*

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THE striking results of sulfanilamide therapy in streptococcal infections and acute gonorrhea reported by numerous observers have led the members of the Gynecological and Obstetrical Service at the Boston City Hospital to extend the application of this drug to the treatment of acute pelvic inflammations. It would be superfluous to review the literature on sulfanilamide therapy. The list of papers on the use of sulfanilamide in streptococcal and gonococcal infections in women comprises over one hundred and fifty references. In marked contrast to this extensive literature, there is a paucity of evidence of the use of the drug in the common types of acute pelvic inflammation.

Gillette,¹ writing on the use of sulfanilamide in infections of the upper genital tract in women, reported a series of 50 cases. Of 16 patients with adnexal masses, 5 were improved, 6 showed no change and in 5 the masses increased in size in spite of the treatment. In 25 cases of recurrent salpingo-oophoritis, 5 showed only "adnexal thickening," and of these 4 became afebrile in five days. In 8 cases with large inflammatory masses, there was no improvement. In 12 patients with small adnexal masses, there was some diminution in size in 5 and no change in 7. Gillette considered sulfanilamide therapy to be more effective during the initial attack than later.

Goff,² with a rather small experience, concluded that in patients seen during the first three days of gonorrheal pelvic infections the process could be aborted by sulfanilamide, but that in those seen later, when mass formation had occurred, improvement was much slower.

Manor,³ in a study of gonorrheal infections of the lower genital tract, found that 36 per cent of the patients also had intrapelvic inflammatory disease. These showed some improvement after the use of sulfanilamide.

Barringer and her associates⁴ noted that adnexal masses lost their tenderness and in some cases diminished in size under sulfanilamide therapy. Increased mobility of the uterus followed. According to their observations, 18 cases were improved, but 12 others showed no improvement.

Sulfanilamide therapy in acute pelvic inflammations has been carried on for more than a year

on our gynecologic wards. We have thus been able to secure accurate data on 72 cases. To find out more definitely what benefit was derived from the use of sulfanilamide, an analysis has been made of 100 patients—as nearly as possible parallel to those who received sulfanilamide—who were treated during the presulfanilamide era by the routine of bedrest, fluids, catharsis, ice or heat to the abdomen and hot vaginal douches. It should be stated here that the patients who were given sulfanilamide received in all other ways the same treatment as the control series. We believed that a comparison of the results in these two series would give a clear idea of the value of sulfanilamide therapy in pelvic inflammatory disease. There were no fatalities in either series.

Although varying degrees of clinical severity appeared in different patients in each series, all presented the following characteristics: elevation of temperature to 101°F or over, acute pain and tenderness, spasm or palpable masses—usually both—at the same or different periods of the process, leukocytosis and vaginal discharge. The majority of these attacks began either during or, more commonly, just after a menstrual period. One point that stands out very clearly in our observations is that recurrent attacks were on the average of shorter duration than the initial attack.

In the series not receiving sulfanilamide, the temperature fell to normal within one week after admission in 72 per cent. Since the other symptoms, such as pain, tenderness and leukocytosis improved almost parallel with the fall in temperature, it seems sufficiently accurate to accept the latter as the measure of improvement. This criterion, therefore, will be used throughout this paper.

The average duration of the febrile reaction in the control series was 67 days. The longest duration of temperature elevation in any case was 35 days. In 63 patients suffering from their first attack the average was 79 days; in 37 patients with recurrent attacks it was 48 days.

Having established a definite standard for comparison of results, we turn to the series treated with sulfanilamide. The routine doses of sulfanilamide administered to patients thus treated were as follows: 120 gr. a day for the first two days, then 90 gr. a day until a definite fall in temperature was noted. The dosage was then cut

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to 60 and later to 40 gr. daily, being omitted after forty-eight hours of normal temperature. Sodium bicarbonate was given with the sulfanilamide in proportions varying from 10 gr. of sodium bicarbonate to 30 gr. of sulfanilamide up to equal amounts of each.

Untoward effects were slight. All cases showed more or less cyanosis, but this was not regarded as a contraindication to continuing the drug. Vomiting occurred in some cases, but was not severe enough to interfere seriously with the treatment. The red-cell and white-cell counts were carefully followed, and the former were more seriously affected than the latter, but not uniformly.

It seems evident that the blood of certain patients is definitely susceptible to the action of sulfanilamide. Marked falls in the red-cell count were limited to a few patients who showed decreases of from 1,000,000 to 1,400,000. The majority showed very slight drops in red-cell count. A few actually showed an increase in red cells while they were under treatment with sulfanilamide, due no doubt to improvement in the general condition from rest and proper diet. In four patients showing marked falls in the red-cell count, transfusion and cessation of medication were deemed advisable.

The white-cell count always dropped in the sulfanilamide-treated patients, but in some it rose at the beginning of the treatment before the sulfanilamide had begun to act on either the corpuscles or the inflammatory process. In these cases, however, the white-cell count eventually dropped to a level lower than that at the beginning of treatment.

It was always difficult to tell how much of the decrease in white-cell count was due to the sulfanilamide and how much to the subsidence of the inflammatory process. In the series not treated with sulfanilamide the average drop was 5200, whereas in those treated with sulfanilamide it was 5500—not a significant difference. In the sulfanilamide series the leukocyte count in 1 case fell to 2400 from an original level of 12,200; the blood cells were carefully checked by the staff of the Thorndike Memorial Laboratory, and no evidence of agranulocytosis or of abnormal relations between the different types of leukocytes was obtained. This patient later went through operation without incident.

Seventy-two per cent of the sulfanilamide-treated patients showed a normal temperature within one week, exactly the same percentage as that of the untreated cases. The average time taken to produce a normal temperature was 5.8 days, a little less than one day shorter than that in the un-

treated cases; this is hardly a striking difference. In primary attacks (44 patients) the temperature elevation averaged 6.0 days, whereas in recurrent attacks (28 patients) the average was 5.7 days. The longest run of temperature was thirty-six days. In this patient the red-cell count fell from 3,600,000 to 2,400,000, and the white-cell count from 26,400 to 12,500 after continuous sulfanilamide therapy for eighteen days. Sulfanilamide administration was stopped, and after three transfusions the red-cell count was raised to 3,900,000; the patient ultimately recovered after developing a pelvic abscess that broke through into the rectum just as she was being prepared for colpotomy. In 1 case a pelvic abscess that formed while the patient was under sulfanilamide treatment was drained by colpotomy on the seventh day after admission; the temperature fell to normal two days later. These 2 cases must be regarded as absolute failures of sulfanilamide therapy.

Another question was whether or not sulfanilamide reduced in any way the number of patients ultimately requiring operation. Of course such statistics are somewhat influenced by the judgment of different operators. Thirteen per cent of the untreated series and 11 per cent of those who had received sulfanilamide were deemed to require salpingectomy. Abscess formation requiring vaginal drainage has already been referred to. In the sulfanilamide-treated series colpotomy was done on 3 of 72 patients, and in the untreated series on 4 of 100, the percentages being identical.

SUMMARY AND CONCLUSIONS

Seventy-two cases of acute pelvic inflammatory disease were treated with sulfanilamide. For purposes of comparison a careful analysis was made of 100 cases of acute pelvic inflammation treated in exactly the same way except that no sulfanilamide was given.

The dramatic results often obtained by sulfanilamide in streptococcal infections and by sulfanilamide and sulfapyridine in pneumonias were disappointingly absent.

The figures show that very little advantage was obtained by the administration of sulfanilamide. It is fair to state, however, that nearly all these patients had been ill at home for a considerable period before entering the hospital. It has been claimed, and may still be true, that sulfanilamide given in gonorrheal infections may prevent the development of tubal involvement; the drug is of little value, however, once the inflammatory process in the adnexa has become well established. Better results might be obtained if it were possible

to get these patients under treatment during the first twenty-four hours of the attack.

With careful blood checking no serious ill effects were experienced from the treatment. Marked damage to the red corpuscles appears to occur only in certain susceptible persons. The drop in the white-cell count is due more to subsidence of the inflammatory reaction than to the destructive effect of the drug on the white corpuscles.

The administration of sulfanilamide in acute pel-

vic inflammatory disease has now given better results than the former methods of treatment.

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REFERENCES

1. Gillette, R. E. Sulfanilamid its use in the female. *California & West* 1938, 3:216-223, 1938
2. Goff, G. F. Sulfanilamide therapy in the female. *M. Woman's J* 46:157-165, 1938
3. Manor, A. Sulfanilamid its use in the lower genital tract of the female. *210, 1938*
4. Barringer, E., Strauss, H., Schoolnik, D. F. and Goldberg, O. Sulfanilamide in the female. *M. Woman's J* 46:157-165, 1938

SPINAL ANESTHESIA IN OBSTETRICS, USING PONTOCAINE-CL

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SPINAL anesthesia, which has found wide applicability for surgical procedures on the abdomen and lower extremities, has not been fully appreciated in obstetrics. Perhaps the reason for this is the effort of a few obstetricians who persist in the belief that spinal anesthesia is dangerous.^{1,2} Reports of successful use of spinal anesthesia coming from different parts of the country do not bear this out, and our experience at the Boston City Hospital leads us to believe that spinal anesthesia is safe if a few simple rules are followed, and that it is very useful for the delivery of selected cases.

The first record of the use of spinal anesthesia in obstetrics is that of Babcock,³ who reported a series of 53 cases, all operative. He made the observation that the uterine contractions continue after spinal anesthesia but, being without the normal aid of the voluntary expulsive forces, are inefficient even when supplemented by the associated relaxation of the pelvic outlet.

Cooke⁴ in 1923, reported a series of 25 cases, of which 6 delivered spontaneously. In 1927 Cosgrove⁵⁻¹⁰ wrote the first of several papers on the subject. On December 31, 1939, his series had grown to include 4880 cases (personal communication), and his papers contain a large amount of data on the subject. He reports 2 deaths, one a case delivered from below, the other in a ruptured ectopic pregnancy.

Stollenwerck¹¹ reported 140 cases. Pitkin, McCormack¹² reported a series of 89 cases delivered from below and 65 cesarean sections without accident. Fraser¹³ reported 64 cases

in the course of eight 150 cases and have considered spinal anesthesia but impressive total

We have devised a method of spinal anesthesia instead of 50 mg of spinal fluid, we use Pontocaine and Sise¹⁴ and add gravity. This is a fourth lumbar needle, with the patient in the position of the solution

The effect of the solution is dependent on scopolamine and the perineum is relaxed, and is a definite advance. The skin and fascia is still present, the incidence of episiotomies is reduced in our cases—in the multiparas there were episiotomies in 5. The degree lacerations in 5. The perineal manipulation is more difficult. We attempted with Pitkin¹⁶ the use of the performance

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ment. As will be discussed later, we agree with Cosgrove⁷ that spinal anesthesia is satisfactory only as an anesthetic for delivery and is not useful as an analgesic during the first or second stage of labor. We try to time the administration in multiparas at full dilatation, with the presenting part in the mid-pelvis or lower mid-pelvis, and in primiparas with the cervix fully dilated and the head low, or otherwise at the time of decision to intervene.

The most satisfactory level of anesthesia extends to the tenth thoracic segment, or just below the umbilicus, for uterine pain from contractions is completely abolished when this level is reached. Anesthesia to the second lumbar segment is sufficient for a low-forceps operation with episiotomy, although the patient is conscious of uterine pain of diminished intensity. The delivery may be postponed for about fifty minutes after the spinal injection, with no effect on the fetus. Usually in sixty to seventy-five minutes, contractions again become painful. However, the anesthesia to the perineum permits repair of lacerations without discomfort for about two hours.

In cesarean sections we use 8 to 12 mg. of Pontocaine (0.8 to 1.2 cc. of a 1 per cent solution and 1.5 cc. of glucose). Usually a sufficiently high level of anesthesia is obtained with the patient in the horizontal position. If the anesthesia has not risen sufficiently high in five minutes, the patient may be placed in a moderate Trendelenburg position for a few minutes. Ordinarily the patient is not placed in Trendelenburg for ten minutes after the injection, and usually not until the abdomen has been opened.

RESULTS

Deliveries from Below

In a period of three months, during which 750 cases were delivered at the Boston City Hospital, 150 patients were delivered from below under spinal anesthesia. This method was usually used in patients in whom an operative delivery was anticipated, and was routinely used for patients with a history of cough, for those with eclampsia, toxemia or heart disease and for those who had recently eaten. There were no maternal deaths and no stillbirths.

Supplementary anesthesia was required in 5 cases. In 4 of these the spinal anesthetic had been given too soon, so that the anesthesia had worn off before delivery could be safely effected. Three were among the first 8 patients on whom spinal anesthesia was tried. The fifth patient had no skin anesthesia, although uterine pain was abolished. In 2 additional cases, the anesthesia did not take effect, but a second injection produced a satisfac-

tory result. In 2 patients not included in the series, we were unable to get into the subarachnoid space. We found, therefore, that the anesthesia was effective in 145 of 152 cases, or 95 per cent. The relatively high incidence of successful anesthesia, in addition to the simplicity of the method, is the chief argument for the choice of spinal over sacral anesthesia.

In two cases not previously mentioned, the anesthesia was repeated because of early administration of the first injection. The second anesthesia was found to last about thirty minutes longer than the first, with no apparent harm to the patient.

The types of delivery are listed in Table 1. Six of the mid-forceps deliveries were done because the anesthetic had been given too soon; if the anesthesia had been postponed, low-forceps or normal

TABLE 1. *Types of Delivery.*

DELIVERY	PRIMIPARAS	MULTIPARAS	TOTAL
Normal	12	15	27
Low-forceps	91	12	103
Mid-forceps	12	0	12
Breech extraction	0	1	1
Footling extraction	1	1	2
Version	0	0	0
Scanloni	5	0	5
Totals	121	29	150

deliveries would probably have resulted. This error was made early in the series, and we believe that it is a matter of judgment in timing the administration. The conversion of a frank breech to a double footling was found to be difficult under spinal anesthesia, because of lack of uterine relaxation, and it was consequently attempted in only 1 case. For the same reason, version was not attempted under spinal anesthesia.

The youngest patient was sixteen years of age, the oldest forty-one. One hundred and seventeen of the patients were twenty-five years old or under. Two had eclampsia, and were delivered by low forceps of living babies; both were well when discharged. Included in the series were 4 cases of pre-eclampsia, 1 of severe, though compensated, rheumatic heart disease, 1 of mild rheumatic heart disease, 1 of severe bronchitis, 1 of asthma and 1 of pyelitis. Several patients were suspected of having pulmonary tuberculosis, but in no case was the diagnosis verified by x-ray.

In 129 cases the level of anesthesia was between the eleventh and fifth thoracic segments; in 10 cases it was above this, and in 9 cases below. In 1 case there was no dermal anesthesia, and in 1 the anesthesia was at the tenth thoracic segment on the right and the first lumbar on the left. One patient had anesthesia to the chin for a short time a half hour after the injection, but felt perfectly comfortable and had no drop in blood pressure.

There was a fall in blood pressure of 20 mm. or more of mercury following spinal anesthesia in 29 of the 150 cases. We believe that many of these were due to the relief from the bearing-down pains rather than to a change in the vascular bed. Fall to a critical level was noted in only 1 case, already mentioned, in which a large dose of Pontocaine had been used. Three minims of a 1:1000 solution of adrenalin hydrochloride intravenously was promptly effective in restoring the blood pressure and the patient's feeling of well-being.

A poorly acting post-partum fundus was noted in 8 cases; usually the uterus contracted well. The placenta was retained in 3 cases. Manual extraction of the placenta was found to be difficult in the 2 cases in which it was done.

Of the late complications encountered, headache was the most frequent. There were 5 severe headaches and 21 slight headaches, none lasting over six days. This is a percentage of 17 and agrees almost exactly with that of Cosgrove.¹⁰ This symptom is not nearly so frequently encountered in general surgical operations, and only 1 of 23 patients with cesarean section had a transitory headache. It seems, therefore, as Cosgrove⁷ suggested, that the changes of spinal-fluid pressure accompanying labor may be a causative factor. Treatment consisted in keeping the patient flat, applying an ice bag to the head and administering codeine and aspirin.

For twenty-four hours two patients had difficulty voiding. There were no pulmonary complications. One prolonged anesthesia of the leg and temporary paresis of the leg muscles following a Scanzoni manipulation was thought to be traumatic obstetric paralysis rather than a result of spinal anesthesia.

Cesarean Sections

During a period of six months 26 of a total of 38 cesarean sections were attempted under spinal anesthesia. In 2 cases the lumbar puncture was unsuccessful, and in 1 case only a saddle type of anesthesia was obtained so that a nitrous oxide-oxygen-ether anesthesia had to be used. The anesthesia was therefore satisfactory in 88 per cent of this small series. In 1 case the patient developed an extreme pruritus after medication, which caused so much restlessness that it was necessary to supplement the anesthesia with nitrous oxide after the delivery of the placenta.

In 22 cases a transverse cervical section was done, and in 1 a Porro.

There was an appreciable blood-pressure drop in only 2 patients, both of whom were operated on for bleeding from placenta previa. The blood pressures fell momentarily to 80 systolic, 58 diastolic, and 64 systolic, 40 diastolic, respectively;

neither case required extreme measures at the moment, but their course suggests that this may not be the best anesthesia for cases with bleeding.

Two cases were in labor. No difficulty was experienced in the extraction of the infant, although uterine contractions could be perceived.

Convalescence was uniformly satisfactory. There were no respiratory complications. There were no deaths and no stillbirths.

The advantages of spinal anesthesia for cesarean section seem to be complete relaxation of the lower abdominal musculature, the absence of any depressing effect on the fetus, and the exceptionally satisfactory convalescence.

DISCUSSION

Advantages and Disadvantages

We believe that spinal anesthesia should be used in patients with toxemia, eclampsia or nephritis; acute or chronic pulmonary conditions; upper respiratory infections; diabetes; and a full stomach. The anesthesia is also useful as a way of delaying labor without injury to the infant. For example, spinal anesthesia was to be used in the delivery of a private case, a multipara, because of a cough of six weeks' duration. Progress in the late first stage was unexpectedly rapid; although the obstetrician could not reach the patient within a reasonable time, spinal anesthesia permitted his delivery of the baby forty-five minutes later with no complications to mother or baby. Another feature of the anesthesia is that the patient may have the thrill of hearing her baby's first cry while having a painless delivery.

The absence of any narcotizing effect on the baby has made it possible to use morphine as a sedative in combination with Seconal and Sodium Amytal, with no marked depressant effect on the baby. Using 3 gr. of Seconal and 6 to 9 gr. of Sodium Amytal, with 1/6 gr. of morphine, we have noted a quiet restful analgesia that is in marked contrast with the analgesia dependent on scopolamine. Cosgrove⁷ first suggested that morphine might be safely used during delivery in combination with spinal anesthesia.

Relaxation of the vagina and the perineum is sometimes quite marked, and is a definite advantage. Tightness of the skin and fascia is still present, however, and the incidence of episiotomies was not greatly reduced in our cases—in the delivery of 121 primiparas there were episiotomies in 73 and second-degree lacerations in 5.

Any intrauterine manipulation is more difficult under spinal anesthesia. Although we attempted no versions, we disagree strongly with Pitkin,¹⁶ who advocates the use of large doses of a spinal anesthetic to relax the uterus for the performance

of version. Large doses may be dangerous, and the tone of the uterus is sufficiently great to make the procedure difficult, if not hazardous.

A further disadvantage is the increased incidence of forceps deliveries. To ensure a normal or low-forceps delivery, we advocate waiting for the head to come well into sight, if possible, in primiparas before administration of the anesthetic.

Physiologic Aspects

Three interesting observations concerning the physiology of labor have been brought to light by these studies, namely, the nerve pain paths associated with labor, the effect of spinal anesthesia on the cervix and the effect of spinal anesthesia on the rate, force and duration of uterine contractions.

Cleland¹⁶ has demonstrated experimentally that pain accompanying childbirth is a combination of a deep uterine pain, which can be blocked by anesthetizing the eleventh and twelfth thoracic segments on both sides, and a pain from the genital tract, which can be blocked by anesthetizing certain sacral roots. We have been able to confirm this in part by noting the effect on uterine pain of spinal anesthesia to different skin levels. There is complete relief from uterine pain when the anesthesia is an inch below the umbilicus or above this level. However, if a lower level of anesthesia is obtained, there is some pain with each contraction, but this pain is of diminished intensity. In the case in which the anesthesia level extended to the tenth thoracic segment on the right side and to the first lumbar on the left, the patient complained of left-sided uterine pain. If the sacral area alone is blocked, the patient notes a diminution of intensity of labor pain; it therefore seems that some of the pain fibers must enter by the sacral and lumbar roots as well as by the eleventh and twelfth thoracic roots.

We were particularly interested in the possibilities of the relaxing effect of spinal anesthesia on the cervix. In the French literature much is written concerning the rapid termination of pregnancy at term by using spinal anesthesia, a method originated by Delmas.¹⁷ To study the effect of spinal anesthesia on the cervix, two multiparous toxemic patients, who were to have their membranes ruptured for the induction of labor, were selected. Spinal anesthesia was administered, and a gentle digital invasion of the cervix was made. This demonstrated in both cases that there is no ready relaxation of the cervix secondary to the spinal anesthesia. Similarly in a patient whose cervix had been well effaced by labor, but was dilated to admit only two and a half fingers, vaginal examination with spinal anesthesia showed the cervix to be no more dilatable than without anesthesia.

It is suggested, therefore, that spinal anesthesia is not an adjunct to *accouchement forcé*.

The third interesting aspect of spinal anesthesia is that uterine contractions continue. This is partly due to the fact that sympathetic fibers from higher in the spinal cord are not blocked, because they descend in the lateral sympathetic trunks.

That the uterus does contract painlessly under spinal anesthesia can be demonstrated by palpating the abdomen. Likewise, at cesarean section under spinal anesthesia on a patient in labor, we have actually observed uterine contractions, as has Cosgrove.⁹ Pressure measurements can be made with a hydrostatic bag inserted into the uterus while the membranes are still intact, and then connecting the bag by a water-filled tube to a mercury manometer. Cosgrove⁹ reports such an experiment and states that there was no essential change in the power of contractions. However, Bourne and Burn¹⁸ performed a similar experiment using Stovaine as the anesthetic, and showed that contractions continued irregularly, but that the uterus did not relax to the same degree between contractions. They concluded that this contraction of the lower segment would slow labor if spinal anesthesia were given early, but would hasten labor if it were given at full dilatation. We have repeated this experiment, and our results did not completely corroborate either of the above observations. Following anesthesia the contractions that had been at regular intervals and of equal intensity and duration became irregular in time, in strength of contraction and in duration. There was no cessation of contractions during the first ten minutes, as is sometimes reported. The base line in our experience remained the same: about 40 mm. of mercury. This indicates a less effective type of labor, which in addition to the loss of voluntary muscle contraction in spinal anesthesia has the effect of checking the progress of labor.

SUMMARY AND CONCLUSIONS

Small doses of Pontocaine, combined with 10 per cent glucose, are recommended for spinal anesthesia in selected obstetric cases, including patients with toxemia, eclampsia or nephritis, with acute or chronic pulmonary infections, with upper respiratory infections or with diabetes and those who have recently eaten. Uterine pain is abolished if the anesthesia reaches above the level of the eleventh thoracic segment. Under this type of anesthesia, uterine contractions continue, although they become irregular, less powerful and of shorter duration; hence, the progress of labor is delayed, and intrauterine manipulation is contraindicated. It has no effect on the dilatability of the cervix.

Pontocaine glucose anesthesia was used for the delivery of 150 patients from below and for cesarean section in 23 patients. There were no stillbirths or maternal deaths. The only distressing complication was headache, which occurred in 17 per cent of the patients delivered from below and persisted for as long as six days.

REFERENCES

- Greenhill J P. Infiltration versus spinal anesthesia in obstetrics and gynecology. *J A M A* 102:532 1934.
- DeLee J B and Greenhill J P. *The 1939 Year Book of Obstetrics and Gynecology* 736 pp. Chicago: Year Book Publishers 1940. P 173.
- Babcock W W. Spinal anesthesia in gynecology, obstetrics and abdominal surgery. *J A M A* 61:1358 1913.
- Cooke H T. Spinal analgesia in obstetrics including cesarean section or painless conscious childbirth. *Am J Surg* 37:107 1923.
- Cosgrove S A. Spinal anesthesia in obstetrics. *Am J Obst & Gynec* 14:51 1927.
- Idem*. Spinal anesthesia in obstetrics. *Am J Surg* 5:602 604 1928.

- Idem*. Further observations on spinal anesthesia in obstetrics. *Anesth & Analg* 9:71 76 1930.
- Idem*. Nitroperoxide subdurally in obstetrics. *Am J Obst & Gynec* 22:63 67 1931.
- Idem*. Experience with lumbar anesthesia in obstetrics. *Am J Surg* 16:466-470 1932.
- Cosgrove S A, Hall P O and Gleason W J. Spinal anesthesia with particular reference to its use in obstetrics. *Anesth & Analg* 16:234 237 1937.
- Stollenwerk A D. Analgesia and anesthesia in obstetrics. *J Florida* 17:263 270 1930.
- Pitkin G P and McCormack F C. Controllable spinal anesthesia in obstetrics. *Surg Gynec & Obst* 47:713 726 1928.
- Fraser R J. Lumbar anesthesia in obstetrics. *Canadian M A J* 40:368 370 1939.
- See L F. Pontocaine glucose solution for spinal anesthesia. *S Clin North America* 15:1501 1511 1935.
- Pitkin G P. Spinal anesthesia in obstetrics and gynecology. *Am J Obst & Gynec* 18:165 171 1929.
- Gleahad J G. Paravertebral anesthesia in obstetrics: experimental and clinical basis. *Surg Gynec & Obst* 57:51 62 1933.
- Delmas P. Some concluding remarks concerning the elective evacuation of the uterus at the end of pregnancy. *J Obst & Gynec Brit Emp* 38:97 107 1931.
- Bourne A W and Burn J H. Act on on the human uterus of anaesthetics and other drugs commonly used in labour. *Brit M J* 2:87 89, 1930.

DIABETES MELLITUS AND PREGNANCY

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THE development of pregnancy in a diabetic woman was a rarity before the discovery of insulin. The cause of the diminished fertility is the severe regressive changes of the ovaries, which manifest themselves in the disappearance of the primordial follicles, with a deficient maturity of the follicles and the lutein bodies. The hypophysis also shows changes from the normal; its weight is decreased and the eosinophilic cells are reduced in number. The basophilic cells show hydropic degeneration. The theory has therefore been proposed that the atrophy of the follicles is due to a decreased function of the hypophysis, namely, a diminished effect of its gonadotropic hormone.¹ In the past, actually only about 5 per cent of all diabetic women became pregnant.

Since the discovery of insulin and its introduction in the treatment of diabetes mellitus, the fertility of diabetic women has distinctly increased and cases of pregnancy and diabetes are observed much more frequently. Therefore, the question of the fate of diabetic pregnant women and the children of diabetic mothers has become considerably more significant.² The mortality was about 45 per cent before the introduction of insulin. It has decreased considerably since then. Nevertheless, it is still estimated as 10 to 17 per cent.²⁻⁵ I can share neither the optimism of some observers nor the pessimism of Bertram,⁶ who states that only in mild cases of diabetes without significant rise of the blood sugar and without tendency to

acidosis should one allow the pregnancy to continue. According to him, every pregnancy should be interrupted with the first sign of metabolic changes, since no one can foresee the outcome for either mother or child. According to Duncan and Fetter,⁷ the need of insulin rises in the first trimester of pregnancy, remains constant in the second trimester, becomes greater in the third and suddenly decreases again after delivery. In my experience, the influence of pregnancy on the diabetic patient is not always the same and cannot be predetermined in any particular case. I have seen diabetic women in whom severe diabetes remained almost constantly unchanged during the whole pregnancy. On the other hand, some pregnant women with mild diabetes suddenly became worse without a demonstrable cause, and rapidly developed coma and died.

Diabetes is even more unfavorable for the unborn child than for the mother. In this regard insulin cannot accomplish much. Before its introduction approximately 60 per cent of such children either were stillborn or died within a few days. Since its introduction the mortality is still about 45 per cent.^{1,8} There are apparently three causes for this failure. The first is because the fetus is often overweight and abnormally large. Bix⁹ found giant infants in 20 per cent of diabetic fetuses, but in only 3 per cent of normal ones. Of 608 children of 155 diabetic mothers, 385 were overweight, 110 had a weight of 4 kg. (8 lb, 13 oz.), 47 of 4.5 kg. (9 lb, 14 oz.), 49 of 5 kg. (11

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lb.) and 17 of greater than 5 kg. (11 lb.). Because of the mother's condition or that of the child, rapid delivery may become necessary and may result in birth injury, at times leading to the death of the child. Secondly, these children may die without any demonstrable cause. And, finally, abortion, miscarriage, and stillbirth are frequent. Children with congenital diabetes, however, are extremely rare; Joslin¹⁰ knows of only 3 such cases.

In attempting to account for the high mortality in the children of diabetic mothers, one finds that the greatest danger exists during delivery, which even when normal may cause considerable injury, especially to the blood vessels. All endeavors to deliver such children alive and keep them so must take this factor into account, and avoid even the most insignificant birth injuries. Nothmann and Hermstein¹¹ were the first to recommend prophylactic cesarean section to preserve the life of these children. Others followed.¹²⁻²² In my experience it has resulted in a marked lowering of the mortality, as shown in the 5 cases reported below. At the same time, investigations were made to determine how the mother and fetus influence each other in regard to carbohydrate metabolism.

CASE 1. A 32-year-old woman, with a history of diabetes of 5 years' duration, was admitted to the hospital on February 6, 1930, in diabetic coma, in the 5th month of her first pregnancy. There was no family history of diabetes. In January the glycosuria had increased considerably, and on February 1 the patient began to feel extremely weak. Severe palpitation of the heart appeared, accompanied by dyspnea and pains in the back and the abdomen.

After the patient had regained consciousness in the hospital labor set in, and the pregnancy was interrupted. The fetus was dead. On February 11, she was transferred to the medical clinic, where she remained until March 15.

TABLE 1. Summary of the Carbohydrate Metabolism of Case 1 during the Last Month of Pregnancy.

DATE	AMOUNT OF URINE	URINE SUGAR	BLOOD SUGAR	DIET	INSULIN
	cc.	gm.	mg./100 cc.	gm.	units
3/30	1200	2.4	232	C.H. 129 P. 44 F. 70	110
4/2	1100	0.6	217	C.H. 140	100
4/5	950	0.8	208	C.H. 140	80
4/15	1400	0.0	197	C.H. 140	70
4/22	1350	0.6	190	C.H. 161	70
4/27	1600	2.8	194	C.H. 189	70
4/28	1750	1.4	185	C.H. 189	70
4/29	1450	0.0	160	C.H. 189	70
4/30	1500	0.2	155	C.H. 189	70
5/1	1100	0.0	140	C.H. 189	70
5/2	1450	0.0	145	C.H. 189	70

The urine was sugar-free on a diet of 48 gm. of protein, 70 gm. of fat and 140 gm. of carbohydrates, with 20 units of insulin twice a day.

After discharge from the hospital the patient followed orders strictly and remained under medical control; the urine was examined daily. With the beginning of a sec-

ond pregnancy in September, 1931, the glycosuria again increased, and the dosage of insulin had to be gradually increased to 110 units to keep the patient sugar free on the same diet. In the 8th month of pregnancy she was readmitted to the hospital and remained there until after delivery. During the last month of pregnancy a considerable amelioration of the diabetes occurred, as shown in Table 1. To avoid hypoglycemic reactions a slight glyco-

TABLE 2. Blood Sugar of Case 1 during Delivery.

DATE	TIME	BLOOD SUGAR	INSULIN	REMARKS
		mg./100 cc.	units	
5/3	7:00 a.m.	140	25	
	12:00	142	25	
	3:00 p.m.			Weak labor
	6:00	150	20	
	9:00	160		
5/4	7:00 a.m.	208	25	
	7:20			Weak labor
	10:00	200	20	
	11:00		20	
	11:20	121		
	12:00			Beginning of operation
	12:10 p.m.	118		Birth
	12:15	110		End of operation
	3:00	134		

suria was permitted. The amount of insulin was diminished considerably, and the carbohydrate intake was increased. On May 3, 1932, the patient was transferred to the obstetric department, where during the afternoon labor started. On May 4 she was delivered by cesarean section under spinal anesthesia; the baby was delivered in 10 minutes, and the entire operation lasted 15 minutes. The child, a boy, weighed 9 pounds, 14 ounces. Table 2 shows

TABLE 3. Summary of the Carbohydrate Metabolism of Case 1 during the First Two Weeks after Delivery.

DATE	AMOUNT OF URINE	URINE SUGAR	BLOOD SUGAR	DIET	INSULIN
	cc.	gm.	mg./100 cc.	gm.	units
5/7	1500	15.0	294	C.H. 171 F. 70 P. 48	70
5/8	1700	31.2	310	C.H. 171	70
5/10	1400	12.6	310	C.H. 171	80
5/13	1300	4.2	241	C.H. 171	80
5/18	1800	4.8	221	C.H. 171	80
5/19	1500	0.0	185	C.H. 171	80
5/20	1600	0.0	149	C.H. 171	60
5/21	1250	0.0	130	C.H. 171	50
5/22	2100	0.0	154	C.H. 171	45

the blood sugar of the mother during the last 2 days of pregnancy. During the early part of labor there was a gradual rise of the blood sugar from 142 to 208 mg. per 100 cc. The blood cholesterol was 224 mg. Two hours before delivery the blood sugar was 200 mg., half an hour before 121 mg., at the time of delivery 118 mg. and at the end of the operation 110 mg., the patient having received an additional amount of insulin (20 units) half an hour before delivery. The sugar content of the amniotic fluid was 108 mg., that of the umbilical vein 94 mg. and that of the umbilical artery 82 mg. The blood cholesterol content of the umbilical vein was 85 mg., and that of the umbilical artery 73 mg.

The abdominal incision healed very quickly. In the first few days the baby was put on the mother's breast. On the 14th day the milk dried up and the child, who was thriving, was transferred to the children's department for further care. After delivery the mother's sugar tolerance

became worse, as compared with that of the last weeks of pregnancy, but improved quickly in 2 weeks' time (Table 3).

Of special significance were the results of the examination of the baby's blood sugar in the first days after birth for 4 days it showed a tendency toward hypoglycemia.

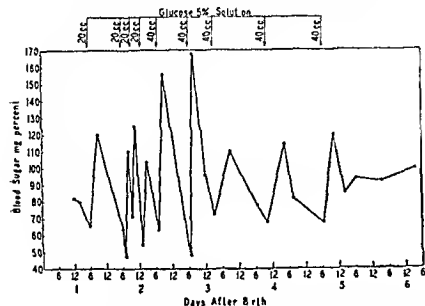


FIGURE 1 Blood Sugar of the Baby in Case 1 during the First Days after Birth

values. During this time there was transient unconsciousness on the 2nd day after the birth, when the blood sugar was 45 mg per 100 cc. Only temporarily could it be elevated by injections of glucose. After the 5th day it remained normal (85 mg) (Figure 1).

CASE 2 The patient was a 29-year-old woman who had suffered from severe diabetes for 6 years. During her married life of 6 years, she had two stillbirths, and the third child had died 2 days after delivery from a cephalic hematoma resulting from a birth injury. Her longing for a living child induced me to recommend prophylactic cesarean section. When the patient became pregnant she resolved to follow this advice. In the early months of pregnancy her sugar tolerance decreased. Having been sugar free before she became pregnant on a diet of 64 gm of protein, 140 gm of fat and 120 gm of carbohydrate, with 50 units of insulin daily, she excreted 30 to 40 gm of sugar in the urine daily. The dosage of insulin had to be increased to 70 units daily, upon which the glycosuria was decreased to 3 to 5 gm daily. To avoid a hypoglycemic reaction the insulin was not further increased. In the 7th month of pregnancy clinical examination demonstrated no changes in the sugar tolerance.

At the end of the 8th month of pregnancy the patient was readmitted to the medical clinic. She had felt labor pains the day before. Large amounts of acetone bodies were found in the urine, also 30 to 40 gm of sugar. The patient was therefore transferred to the obstetric clinic and delivered by cesarean section. The baby, a boy, weighed 7 pounds, 1 ounce, and remained alive. The blood sugar taken during the operation was 132 mg per 100 cc. At the end of the operation it was 120 mg and the blood cholesterol was 214 mg. The sugar value of the amniotic fluid was 104 mg, that of the umbilical vein 93 mg and that of the umbilical artery 86 mg. The cholesterol in the umbilical vein was 78 mg and that in the umbilical artery 58 mg.

The baby was breast fed for 18 days, when the mother became ill with mastitis. The milk dried up several days later. After delivery and during lactation a considerable improvement in sugar tolerance was noted in the mother. On a diet of 66 gm of protein, 155 gm of fat and 150 gm of carbohydrate, with 60 units of insulin daily, she was sugar free. The fasting blood sugar was 188 mg. The

baby's blood sugar showed a tendency to hypoglycemia for 5 days (Table 4), and was only temporarily increased by injections of glucose.

CASE 3 The patient was a 24-year-old primipara who had suffered from diabetes for 2 years. She had had only dietetic treatment. In the 8th month of pregnancy large amounts of ketone bodies were found in the urine without a demonstrable cause. On admission to the medical clinic the blood sugar was 286 mg per 100 cc, 1.25 gm of acetone and 6.64 gm of oxybutyric acid per 100 cc were found in the urine, and 0.15 gm of acetone and 0.69 gm of oxybutyric acid in the blood. A living child was delivered.

TABLE 4 Blood Sugar of the Baby in Case 2 for Several Days after Birth

DATE	TIME	BLOOD SUGAR mg / 100 cc	TREATMENT
6/2	1 30 p.m.	86 (umbilical artery)	20 cc 5% glucose subcutaneously
	4 00	82	
	8 00	68	
	8 30		
6 3	6 30 a.m.	72	40 cc 5% glucose subcutaneously
	9 30	54	
	10 00		
	11 00	136	
6 4	4 00 p.m.	102	40 cc 5% glucose subcutaneously
	8 00	6	
	8 30		
6 4	6 30 a.m.	84	40 cc 5% glucose subcutaneously
	10 00	74	
	10 30		
	2 00 p.m.	102	
6 5	6 00	76	40 cc 5% glucose subcutaneously
	9 00	45	
	9 30		
6 6	6 30 a.m.	78	20 cc 5% glucose subcutaneously
	10 30		
	12 00	134	
	6 00 p.m.	85	
6 7	6 30 a.m.	94	20 cc 5% glucose subcutaneously
	10 00	55	
	2 00 p.m.	82	
	6 00	80	
6 8	6 30 a.m.	97	
	12 00	95	
	8 00 p.m.	98	
6 9	6 30 a.m.	96	
	2 00 p.m.	92	

by prophylactic cesarean section, the baby, born in the middle of the 8th month, weighed 5 pounds, 5 ounces. The blood sugar of the mother at the end of the confinement was 124 milligrams per 100 cc., the sugar of the amniotic fluid was 110 mg that in the umbilical vein 92 mg and that in the umbilical artery 82 mg. The mother's blood cholesterol was 302 mg per 100 cc. Tables 5 and 6 demonstrate the values of the blood sugar of the mother during the confinement, and of the baby for several days after delivery.

The patient recovered very quickly after the operation. The breast feeding had to be stopped after a few days because of lack of milk. The diabetes improved rapidly after delivery. Fourteen days after delivery 10 units of insulin was needed daily. A week later the injection of insulin was stopped.

The baby developed icterus neonatorum 2 days after birth; this disappeared 8 days later. Table 7 shows the cholesterol values from the birth until the recovery from the jaundice.

CASE 4. The patient was a 32-year-old woman with severe diabetes of 7 years' duration. Four years previously a precomatose condition had developed. She had married

TABLE 5. Blood Sugar of Case 3 during Delivery.

DATE	TIME	BLOOD SUGAR mg./100 cc.	INSULIN units	REMARKS
3/4	12:30 p.m.	286		
	1:30		30	
	4:00	225		
	6:00	210	20	
	8:00	192		
3/5	6:30 a.m.	210	20	
	9:00	176	10	
	11:00	135		
	11:30		10	Beginning of operation
	11:50			Birth
	11:58	124		End of operation
	2:00 p.m.	132		
	2:30		10	
	6:00	102		

3 years previously and had given birth to a stillborn child a year later. She was admitted to the clinic during the 8th month of her second pregnancy. The baby was delivered by prophylactic cesarean section and weighed 5 pounds, 5 ounces. The 2nd, 3rd and 4th days after birth

TABLE 6. Blood Sugar of the Baby in Case 3 for Several Days after Birth.

DATE	TIME	BLOOD SUGAR mg./100 cc.	TREATMENT
3/5	11:00 a.m.	82 (umbilical artery)	
	2:00 p.m.	68	
	2:30		20 cc. 5% glucose, subcutaneously
	4:00	128	
	8:00	111	
3/6	7:30 a.m.	72	
	10:00	58	
	10:30		20 cc. 5% glucose, subcutaneously
	12:00	132	
	4:00 p.m.	69	
3/7	4:30		20 cc. 5% glucose, subcutaneously
	8:00 a.m.	78	
	8:30		20 cc. 5% glucose, subcutaneously
	12:00	104	
	6:00 p.m.	72	
3/8	6:30		20 cc. 5% glucose, subcutaneously
	8:00 a.m.	116	
	12:00	102	
3/9	4:00 p.m.	96	
	8:00 a.m.	102	

the child had spells of unconsciousness, which were promptly relieved by injections of glucose. The blood sugar on the 2nd day of life during an attack of unconsciousness was 43 mg. per 100 cc. The blood cholesterol was 66 mg. Detailed investigations of the metabolism could not be made.

CASE 5. The patient was a 28-year-old woman who had had diabetes since the age of 18. She married at 24 and at 26 had a miscarriage. She was delivered by prophylactic cesarean section in the ninth month of pregnancy. The child, a girl, weighing 5 pounds, 10 ounces, sank into transient unconsciousness on the 3rd and 5th days after delivery. In this case also, injections of glucose were given

with quick response. The blood sugar of the mother during labor, 1 hour after the injection of 15 units of insulin, was 125 mg. per 100 cc. The sugar of the amniotic fluid was 98 mg., the blood sugar in the umbilical vein

TABLE 7. Blood Cholesterol of the Baby in Case 3.

DATE	BLOOD CHOLESTEROL mg./100 cc.
3/5	162 (umbilical artery)
	130 (umbilical vein)
3/7	187
3/9	192
3/12	126
3/16	95

90 mg. and that in the umbilical artery 85 mg. The blood sugar of the baby during her unconsciousness was 38 mg. The blood cholesterol of the mother on the day of confinement was 225 mg. per 100 cc. The blood cholesterol of the baby at the same time was 74 mg. and on the 3rd day of life 68 mg.

DISCUSSION

The five cases described are remarkable from different points of view. The influence of pregnancy on the diabetes of the mother cannot be predicted with any certainty. In Case 1 the first pregnancy ended with diabetic coma, whereas in the course of the second pregnancy a remarkable improvement of the sugar tolerance was noted toward the end of the pregnancy. In Case 2 the patient showed considerable increase in the severity of the diabetes at the end of the pregnancy. Case 3 showed, without a marked increase of glycosuria, an alarming increase of the ketone bodies in the blood and urine with the end of the pregnancy. Although others have reported improvement of the sugar tolerance at the end of the pregnancy, I can record only one such case, namely, Case 1 in the second pregnancy. In the other pregnancies the contrary was noted. At about the end of pregnancy a diminished sugar tolerance appeared. Since it is known from the investigations of Carlson and Ginsburg¹³ and Pack and Barber¹⁴ that internal secretions of the pancreas can penetrate through the placenta, it might have been expected that the fetal pancreas would help support the metabolism of the mother. But evidence of such effect could only be supposed in the second pregnancy of Case 1. This aid was not sufficient to compensate for depression of the tolerance caused by the pregnancy itself.

In Cases 1 and 2 the mothers nursed their babies, one of them only for a short time. Aggravation of the diabetes by the lactation could not be observed. On the contrary, in Case 1 considerable improvement began during childbirth, as in some of Wilder's patients.²

The observations made on the carbohydrate metabolism of the babies are of particular interest.

The blood sugar level showed a tendency to descend to hypoglycemic values several days after delivery. Amounts between 45 and 70 mg per 100 cc. were repeatedly observed during a single day. Similar amounts were also noted by Randall and Rynearson.²² Three babies had spells of unconsciousness several times during the first days of life. This was promptly relieved by glucose injection. In two cases a normal blood sugar level was attained only five days after birth. Crevel¹⁸ states that the fasting blood sugar of children of healthy mothers may decrease to extremely low values in the first month of life, and Schretter and Nevinsky¹⁶ have shown low levels during a fasting state in the first days. On the other hand, Rowley,¹⁷ Morris¹⁸ and, recently, Helwig¹⁹ have found the blood sugar level of the babies of diabetic mothers to be not abnormally low. Crevel points out that in those cases in which he had found extremely low blood sugar values no clinical evidence of hypoglycemia ever appeared. Therefore, it is remarkable that repeated unconsciousness has been observed in three cases among those described here. It is also noteworthy that the babies of diabetic mothers seem to differ from other children, since the tendency of the blood sugar to diminish to very low values was again noted a short time after an injection of glucose.

The low blood sugar levels repeatedly noted may be explained by an overfunctioning of the pancreas of the children of diabetic mothers. The second of my patients gave birth to a living baby in her third pregnancy, but it died in a few days as a result of birth injury. I had the good fortune to obtain an examination of the pancreas of this child by Heiberg.²⁰ The gland weighed 5 gm., and the islets of Langerhans were well developed. Nakamura,²¹ who inspected pancreases in different periods of life, found the weight of this organ to be 14 gm. in a baby who had lived only one day, and 15 gm. in a baby four days old. The gland of a baby of six days of age weighed 14 gm., of seven days 15 gm., and of eight days 18 gm. The weight of 5 gm. was not attained till the third to fifth month of life. The pancreas in Case 2 was therefore three times the size of the gland of the average newborn child. It is assumed that the hypoglycemic state of the children of diabetic mothers is due to the hypertrophy of the baby's pancreas. The fetus nourished by the blood of the mother has a permanent surplus of carbohydrate in the form of sugar that she is unable to burn. This excess leads to hypertrophy of the gland and to an increased production of insulin. The increased supply and utilization of the carbohydrates offered by the mother probably ac-

count for the frequently observed fact that the children of diabetic women are extremely big and excessively fat. In the milder cases of diabetes, the increased amount of insulin produced by the fetus seems to be sufficient to improve the condition of the maternal carbohydrate metabolism, and in the first days after birth leads to the hypoglycemic state of the baby, as described above.

Recently Helwig¹⁹ has examined the pancreases of children of diabetic women and has found, in the vast majority, amounts of pancreatic tissue considerably larger than those in the children of nondiabetic mothers. Of 9 cases examined he apparently found in 3 a normal number of islets of Langerhans. He states that in the first case—that of a fetus in the sixth month—the gland weighed 0.8 gm. The pancreas in the second case—that of a fetus in the seventh month—weighed 1.2 gm., and the gland in the third case—that of a fetus of eight months—weighed 5 gm. Considering that, according to Nakamura,²¹ the pancreas of a child born at full term weighs 12 gm., and that it attains a weight of 5 gm. only after the third to the fifth month of post partum life, one must conclude that these three pancreases were abnormally heavy.

Since the hypoglycemia disappears after a few days, one may assume that the overproduction of insulin in the baby of the diabetic mother ceases, and that the islets of Langerhans in the pancreas become adjusted to the needs of the organism.

The cholesterol of the diabetic pregnant women was found to be increased, as is generally shown in the literature. Although some of the patients suffered from severe diabetes, the severity seemed to have no particular influence on the cholesterol values. I found in only one case a cholesterol level of over 300 mg per 100 cc. Four of the 5 babies had cholesterol values between 58 and 74 mg. Joslin¹⁰ also states that in newborn babies of diabetic mothers the cord blood cholesterol has ranged from 50 to 65 mg.

The cholesterol is highest in the maternal blood, lower in the umbilical vein and lowest in the umbilical artery. In only one baby was there a cholesterol level of 162 mg per 100 cc. in the umbilical artery, which is extremely high in this period of life. In this case the cholesterol in the umbilical artery was higher than that in the umbilical vein. On the second day after birth this baby developed an icterus neonatorum that disappeared about the tenth day of life. On the third day, shortly after the beginning of the icterus, the cholesterol was 187 mg., on the eighth day it was 126 mg. and on the twelfth day, after the jaundice

had disappeared, 95 mg. per 100 cc. The mother had the highest cholesterol level among the pregnant diabetic patients. But it is unlikely that the high level of the child was inherited from the mother, because the cholesterol of the umbilical artery was higher than that in the umbilical vein and because the baby's cholesterol continued to increase in the first days of its life. Perhaps the high cholesterol should be considered the first sign of the jaundice that developed later.

The observations here described were made during the course of several years. The children developed well and continued to be healthy. The prophylactic cesarean sections were undertaken in patients who had had stillbirths, miscarriages or living children who died a few days after birth. They resulted in the birth of living, healthy children. Considering the extremely high mortality of children born of diabetic women allowed to go to the normal delivery, it is fair to assume that cesarean section as a prophylactic measure offers a more favorable prognosis. Among five children thus delivered no mortality was noted.

SUMMARY

Five diabetic women with a past history of several abortions and stillbirths were successfully delivered by prophylactic cesarean section.

The high mortality rate of children of diabetic mothers may be decreased by this procedure.

The influence that pregnancy will have on the diabetes of the mother cannot be predicted in any case, in spite of careful treatment. In the same patient, pregnancy at different times may take a very different course.

A state of hypoglycemia in babies during the first days of life sometimes accompanied by periods of unconsciousness is described. The cause of this condition is the hypertrophy and overfunction of the pancreas.

The cholesterol level of the newborn babies ranged from 58 to 74 mg. per 100 cc. Only one baby had a value of cholesterol of 162 mg. This baby later developed an icterus neonatorum.

Considering the extremely high mortality rate of the fetuses and children of diabetic women, prophylactic cesarean section offers a favorable outlook. Therefore, this procedure is recommended to save the life of the endangered fetus.

REFERENCES

1. Kraus, J. Diabetes mellitus und Schwangerschaft. *Med. Klin.* 32:375-378, 1936.
2. Wilder, R. M. and Parsons, E. Treatment of diabetes during pregnancy. *Colorado Med.* 25:372-382, 1928.
3. Hansen, O. S. Insulin in obstetrics. *Minnesota Med.* 11:803-807, 1928.
4. Walker, A. Diabetes mellitus and pregnancy. *J. Obst. & Gynec. Brit. Emp.* 35:271-281, 1928.
5. Bowen, B. and Heilbrun, N. Pregnancy and diabetes: with a report of five cases and a review of the literature. *Am. J. M. Sc.* 183:803-811, 1932.
6. Bertram, Zuckerkrankheit und Schwangerschaft. *Zentralbl. f. Gynäk.* 59:2681, 1935.
7. Duncan, G. G. and Fetter, F. The effect of pregnancy on the insulin requirement of the diabetic. *Am. J. M. Sc.* 187:347-351, 1934.
8. Gerstmann, H. and Klaffen, E. Zur Kenntnis des sogenannten Schwangerschaftsdiabetes. (Diabetes mellitus gravidarum). *Zentralbl. f. Gynäk.* 61:914-920, 1937.
9. Bix, H. Ueber Beziehungen zwischen mütterlichem Diabetes und Riesenkindern. *Med. Klin.* 29:50-52, 1933.
10. Joslin, E. P. *The Treatment of Diabetes Mellitus*. Fifth edition. 670 pp. Philadelphia: Lea & Febiger, 1935.
11. Nothmann, M., and Hermstein, A. Diabetes und Gravidität. *Arch. f. Gynäk.* 150:287-301, 1932.
12. Titus, R. S. Diabetes in pregnancy from obstetric point of view. *Am. J. Obst. & Gynec.* 33:386-392, 1937.
13. Carlson, A. J. and Ginsburg, H. The influence of pregnancy on the hyperglycemia of pancreatic diabetes. *Am. J. Physiol.* 36:217-222, 1915.
14. Pack, G. T. and Barber, D. The placental transmission of insulin from fetus to mother. *Am. J. Physiol.* 90:466, 1929.
15. van Creveld, S. Carbohydrate metabolism of premature infants: blood sugar during fasting. *Am. J. Dis. Child.* 38:912-926, 1929.
16. Schretter, G. and Nevinny, H. Zur Histopathologie der Zuckerkrankheit bei Neugeborenen und Säuglingen. *Arch. f. Gynäk.* 143:465-476, 1930.
17. Rowley, W. N. Observations on the blood sugar during pregnancy and the puerperium. *Am. J. Obst. & Gynec.* 5:23-32, 1923.
18. Morris, W. H. The obstetrical significance of the blood-sugar with special reference to the placental interchange. *Bull. Johns Hopkins Hosp.* 28:140-146, 1917.
19. Helwig, E. B. Hypertrophy and hyperplasia of islands of Langerhans in infants born of diabetic mothers. *Arch. Int. Med.* 65:221-239, 1940.
20. Heiberg, K. A. Das Inselgewebe bei einem neugeborenen Kinde einer zuckerkranken Mutter. *Virchows Arch. f. path. Anat.* 287:629-633, 1933.
21. Nakamura, N. Untersuchungen über das Pankreas bei Föten, Neugeborenen, Kindern und im Pubertätsalter. *Virchows Arch. f. path. Anat.* 253:286-349, 1924.
22. Randall, L. M. and Rynearson, E. H. Delivery and care of newborn infant of diabetic mother. *J. A. M. A.* 107:919-924, 1936.

MEDICAL PROGRESS

THE PHYSIOLOGIC AND THERAPEUTIC EFFECTS OF HYPOTHERMIA*

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COOLING of the superficial layers of the skin has been employed as a physiotherapeutic procedure for countless centuries. Shivering accompanies the sensation of "coldness," and the subject may complain that he is "freezing." There is not, however, a significant lowering of the internal temperature of the body, and except in certain unusual circumstances, the depression rarely exceeds 2 or 3°F. This minor variation stands in sharp contrast to the heroic depression of body temperature (10 to 20°F.) employed recently in the treatment of certain pathologic conditions.

A general lowering of the body temperature was described in the lay press less than two years ago as another procedure useful in the treatment of patients with cancer, and the most optimistic reports alluded to it as "another cure" for cancer. The terms employed in describing the treatment included "freezing," "frozen sleep," "hibernation," "refrigeration" and "cryotherapy." An objection may be raised against the use of each of the terms. "Freezing" and "frozen sleep" are misnomers. No part of the body is frozen; in fact, during most of the treatment the body is exposed to temperatures considerably higher than 32°F., and the purpose of the procedure is to lower body temperature generally, meanwhile exercising great care to avoid freezing any tissue. Fay¹ prefers the term "hibernation" for a general lowering of the body temperature, and "refrigeration" for local cooling. Vaughn² has chosen "experimental hibernation," and Gerster³ and Sauer,⁴ "cryotherapy." Hibernation is a more acceptable term than freezing, but it is not ideal. Physiologic hibernation is peculiar to certain animals only and not to man. Furthermore, in the hibernating state of animal life the body temperature falls to within a few degrees of that of the environment. In the procedure under discussion, the temperature differential between body and environment is from 20 to 50°F. Cryotherapy could be rejected on two counts. If one wishes to anglicize Greek roots, the composition would be cryotherapy⁶ rather than

cryomotherapy. Secondly, one's interest in the effect of low temperatures might well extend beyond its therapeutic possibilities. It is believed that the nomenclature would be more accurate if "hypothermia"⁶ were selected to describe the procedure. It is a scientific term and is not medical jargon. It will be retained in this report wherever it is convenient to refer to a lowering of body temperature.

The initiation of interest of Fay and Henny⁷ in low temperatures was associated presumably with the observation that primary and metastatic cancer rarely involve the parts of the body where reduced temperatures prevail,⁸ that is, reduced as compared with the organs and portions of the body where optimal high temperatures prevail. Thus the extremities are rarely the site of neoplastic tissue and enjoy a low temperature in contrast to the breast, which has a high temperature and is involved frequently with cancer. In pursuing this subject, Smith and Fay⁹ investigated the effect of temperature on the growth and development of the chick embryo. Exposure of eggs to temperatures that varied between 85 and 95°F. for from two to four days at the beginning of the incubation period—the remainder of the incubation proceeding at the optimal temperature (100.5 to 101.0°F.)—resulted in the retardation of growth and the appearance of regressive changes. Developmental malformations were equally prevalent.

In the first clinical report of these authors,⁹ hypothermia was reported to be extremely useful in the treatment of cancer. After a relatively short period of trial,—approximately two years,—this statement has been rigidly qualified. Hypothermia is not recognized as a cure for cancer at present by even the most optimistic of its proponents. It does have a place, however, in the treatment of a selected group of patients suffering from this malady. Furthermore, a study of the physiologic changes associated with a lowering of body temperature may clarify certain problems concerning carbohydrate metabolism, conduction of the nerve impulse, mental processes, the cardiovascular system, the function of the kidneys and the heat regulatory mechanism. Lastly, hypothermia may find extensive application in the rapidly expanding

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The experimental work on hypothermia reported from this laboratory was supported by grants from the Lucius N. Littauer Foundation and the Core Industries Research Foundation.

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field of general medical therapeutics. It seems opportune, therefore, to present this progress report.

The majority of the patients treated by hypothermia reported by Smith and Fay⁹ were suffering from inoperable and frequently metastatic cancers. The internal temperature of the body was reduced about 10°F. by exposing the nude anesthetized patient to a bed of cracked ice. The ice was removed subsequently, and general hypothermia was maintained for twenty-four hours or longer by keeping the environmental temperature below 60°F. Certain impressive results were noted. In every case there was a prompt reduction in pain. In many patients the reduction became complete and persisted so for several weeks. This is of particular interest because many had required from 5 to 10 gr. of morphine daily for relief of pain, and several had been referred to a neurosurgical service for chordotomy. By the continued use of local cold for several weeks following the general hypothermia, it was possible to avoid surgical intervention, and in most patients to prevent the subsequent return to large doses of sedatives.

Furthermore, there has been regularly a rapid, gross, measurable decrease in the size of the lesion within twenty-four to forty-eight hours. In a few cases, this has been as much as 50 per cent. This decrease in size had progressed steadily during the course of treatment. There has been a general improvement in the patient's condition, with a gain in weight, a better appetite and a change for the better in the mental state. There has regularly developed a notable tendency toward healing of previously intractable ulcerative cutaneous lesions and fistulous tracts. It must be remembered that these patients had all been given up from the standpoint of the more orthodox methods: operation and irradiation. There has been a marked retardation in recurrences, and the rate of growth during recurrences has been definitely diminished, as shown by careful studies by one of us (Smith) of several biopsy specimens taken at intervals during the course of treatment. In at least two instances there has been complete disappearance of the local lesion.⁹

This very encouraging report has been modified¹ recently without lessening the significance of the earlier contribution.

Before proceeding with the topic under consideration, it may be of interest to inquire about the lowest internal temperature that man can tolerate. Contrary to previous medical teachings, it probably lies somewhere between 70 and 75°F., and not between 90 and 95°F. In 1875 Reincke¹⁰ reported the findings on five inebriated persons who had accidentally been exposed to cold. The rectal temperatures after admission to the hospital of the two who recovered were 75.2 and 86°F. respectively. The three who did not recover had temperatures of 79.5, 80.6 and 83.1°F. respectively. Nicolaysen¹¹ observed a rectal temperature of

76.4°F. in an acutely intoxicated patient, who recovered. During therapeutic reduction of body temperature, Fay¹ observed a minimum of 74°F. in one patient who did not survive treatment. Under similar circumstances Dr. Kenneth J. Til- lotson and I⁶ have observed a patient whose rectal temperature reached 74°F. at one time and whose temperature remained below 80 for more than ten hours. A second patient in our series had a recorded rectal temperature of 75°F. Recovery was uneventful in both. It is possible that these are above the critical level under ideal conditions, that is, in a hospital under close medical supervision, but they are probably not far above this level.

Homoiothermic animals (nonhibernating mammals), such as the cat,¹² the domestic rabbit¹³ and the monkey (*Macacus rhesus*),¹⁴ on the other hand, have been known to live following a reduction of body temperature to as low as 56 or 60°F. It is not certain whether this represents a real physiologic difference between lower animals and man, or whether it is related to the greater risk that may be taken with animals and the sacrifice of many to achieve an extremely low temperature in a few. The heat regulatory mechanism presumably ceases to operate below 75°F. in animals, and the continued fall in body temperature proceeds at the same rate as that in a dead animal under similar circumstances.¹² If the animal is then warmed, the thermal regulatory mechanism begins to assert itself at approximately 75°F. In the hibernating animal, the body temperature may approach 32°F. without causing death.

For additional information concerning hypothermia in human beings one must be satisfied with a very limited bibliography. There are several explanations for this. The employment of general hypothermia in the practice of medicine is recent. Only a few hospitals have been actively interested in the problem, and the number of workers in the field is small. The induction and maintenance of general hypothermia require considerable technical equipment and professional attention, and are not without danger to the subject. Because of the unavoidable risk associated with each treatment, it is probably desirable that only a few hospitals explore the therapeutic possibilities of hypothermia for the present. If a hazardous procedure such as this were mishandled, it might well fall into unwarranted disrepute before the facts and fallacies accompanying it were clearly defined.

INDUCTION AND MAINTENANCE OF GENERAL HYPOTHERMIA

The methods employed by the various investigators for the preparation of the patient and the

induction of hypothermia are similar. Written permission to conduct the treatment should be obtained from the patient or the legal guardian. A laxative may be administered the night before induction, followed in eight hours by an enema. It has seemed preferable to take patients who have not eaten for twelve hours, but probably this is not imperative. Three or more grains of Nembutal are given intramuscularly twenty minutes before the patient is placed in a cold environment. The sedative effect of Nembutal is desirable, but its most important action is on the heat regulatory mechanism. A drop in the body temperature is achieved without difficulty if the patient is prepared with Nembutal; otherwise, it may be very difficult, other aspects of the treatment being equal. When the stage is set, the patient is prepared finally with an anesthetic that is effective over a relatively short period of time. For this, from 0.5 to 0.7 gm. of Evipal, given intravenously, has been very satisfactory in my experience. As soon as the anesthesia has achieved its full effect, a rectal thermocouple* is inserted, and the patient is placed nude in an environment of approximately 32°F. Either especially constructed blankets† or cracked ice may be employed for the induction of hypothermia. Within an hour, the anesthetic effect of the Evipal has for the most part worn off, and simultaneously the body temperature decreases. The anesthetic property of the cold^{13, 16} usually obviates the necessity for further intravenous anesthesia or sedative. All the patients whom Dr. Tillotson and I have studied have been relatively quiet without further anesthesia when the body temperature has been maintained below 90°F. During the induction of hypothermia, the temperature drop may be as rapid as 3°F. an hour, or as delayed as 0.5 an hour. When the desired minimal body temperature is approached, the environmental temperature is raised. Since an internal body temperature less than 80°F. approaches the critical level, we have endeavored to maintain a working range for internal temperature between 80 and 90°F. By alternately lowering and raising the external temperature, the internal temperature may be controlled within a range of 2 to 3°F.

In the earlier studies of Fay and Smith, the period of hypothermia did not exceed three days. The term of treatment was extended as the work progressed and as the body appeared able to tolerate longer sessions. If one wishes to refer to a "record," I have not found any reference that exceeded an eight-day treatment.⁴ The body tem-

perature was maintained at a level of approximately 85°F. the greater part of the time. It is the current belief that regressive changes in metastatic tissue associated with general body temperatures below 90°F. are not evident until a temperature as low as this has been maintained for a minimum of five days. In some patients intermittent periods totaling more than three hundred hours must be tried. The failure of Vaughn² to duplicate Fay's results may be attributed in part to the duration of treatment. Vaughn induced hypothermia in 6 patients, and maintained hypothermia for an average of not more than thirty-six hours. The treatments were not repeated. He stated that "the procedure was hazardous and not justifiable in the treatment of hopeless metastatic carcinoma." Fay has supervised approximately one hundred and seventy-five treatments since he began them in December, 1938, and believes that further study is indicated. I concur in this belief.

Fay⁷ has deemed it advisable to go through a trial treatment of not more than twenty-four hours to gather information concerning the reaction of the patient to the procedure. Undoubtedly, this is important for patients who have metastatic cancer or who are older than forty. It is probably unnecessary for patients who are in reasonably satisfactory physical condition, and who are younger than forty. Following the initial treatment there may be one or more additional periods of from two to four days each. The intervals between successive treatments may be as short as two or three weeks. It is unknown just how many times the treatment may be repeated or whether many permanent harmful effects follow a large number of successive treatments.

The patients, usually, are drowsy and stuporous during the treatment, but they are not comatose unless they are sedated heavily or unless the body temperature goes below 80°F. Some observers allow the subjects to eat solid food from time to time. In an attempt to collect satisfactory metabolic data in our series, we have preferred to introduce measured amounts of water, salt and glucose by way of a stomach tube. Most patients have tolerated 50 cc. of 5 per cent glucose in normal saline by this route every thirty minutes. Gastric absorption of food and fluid appears to proceed at a normal rate in human beings exposed to cold.¹⁰ In dogs,¹⁷ the emptying time of the stomach decreases slightly.

When it has seemed desirable to terminate the treatment, which usually is an arbitrary decision, the external environmental temperature is allowed to approach 70°F. It has been our experience that a gradual restoration of body tem-

*A continuously recording instrument (Nicromax) is manufactured by Leeds and Northrup, Philadelphia, Pennsylvania.

†Blankets adapted for a continuous flow of refrigerant are manufactured by the Therm-O-Rite Products Company, Buffalo, New York.

perature, that is, not greater than 2°F. an hour, is associated with fewer ominous signs than a rapid rise. Following restoration, most patients show a rise above normal for a short time.

COMPLICATIONS AND MORTALITY

We have observed no serious post-treatment complications. Some of the patients have developed mild edema of the extremities for a few days. No other physical findings have been observed in those who before the treatment were relatively sound physically. Neither an upper respiratory infection, pneumonia nor acute nephritis has appeared in any of our patients. This is of interest when considered together with the observation of Foord¹⁸ that the agglutinin production of rabbits increases following exposure to cold, the increase persisting for as long as twenty-four hours after exposure. Autopsy findings of patients dying from cancer have confirmed the impression that normal tissue is not harmed by general hypothermia.^{19, 20} Furthermore, healing of tissue proceeds uninterruptedly during local hypothermia, with a minimum of scar formation.

Fatalities have occurred within twenty-four hours after treatment. In our series there were two deaths among twenty patients. Both were from cardiac failure, and both occurred during the period of hypothermia. One was probably preventable, the other was not. The first death occurred very early in the series, when the necessity for slowly warming the patient during restoration of body temperature was not appreciated. The second death occurred in a woman suffering from extensive metastases from a primary carcinoma of the breast, scirrhus carcinoma of the stomach, coronary heart disease and morphinism. She was a very poor risk, and hypothermia was considered only as a last resort. She died during treatment after her body temperature had been maintained between 86 and 89°F. for thirty hours. If one discounts this death, the mortality rate in our series is low. This statement is not made, however, to minimize the risk of treatment. The experience of other observers with chronically ill patients is similar to ours. Cardiovascular failure and pneumonia have accounted for most of the fatalities. The development of pneumonia in patients with metastatic cancer in the lungs is sufficiently common to cause rejection of such patients for treatment.²¹

PHYSIOLOGIC AND BIOCHEMICAL PHENOMENA OBSERVED DURING HYPOTHERMIA

Changes in the vascular system develop early; they are profound in magnitude and marked in

their variations from the normal. Following an initial rise of pulse and blood pressure, there is a gradual fall of both until the minimum body temperature is reached. In human beings the heart rate rarely falls below 50 a minute, whereas in nonhibernating animals exposed to cold, it may slow to 14 or 16.¹³ The changes in pulse and blood pressure are associated with a marked vasoconstriction, arterial and venous, which becomes general as the temperature declines. Obliteration of peripheral venous channels, such as may be observed during casual exposure of an extremity to the cold, is noticed first. Drawing of venous blood becomes very difficult and may subsequently be impossible in a person who presents no difficulty at normal body temperature. With continued hypothermia, constriction of the large arteries occurs, and frequently one is able neither to elicit the radial or brachial pulse nor to obtain a blood-pressure reading in the customary manner. The blood pressure and peripheral pulse may be unobtainable for several hours, yet vascular occlusion or thrombosis is not a complication. Blood does flow in the arterial channels, however, because arterial punctures are possible, and in our series furnished most of the samples used for determining the concentration of the various blood constituents.

An increase in the circulation time of venous blood and a decrease in volume of circulating blood are other consequences of prolonged vasoconstriction. The circulation time from arm to leg may be prolonged two or three times over normal.²² Observations of blood and plasma volume have not been reported for man, but in animals Harkins and his associates^{23, 24} have observed a decrease in blood volume. This is the result presumably of the migration of fluid from the vascular channels into the interstitial spaces.

Cardiac arrhythmias, sinus arrhythmia and auricular fibrillation are frequently observed during treatment. The lower the body temperature, the greater the likelihood of the development of an arrhythmia.²⁵ All our patients whose temperatures reached 80°F. developed fibrillation. Digitalis, quinidine and restoration of body temperature are effective in correcting this disturbance. Electrocardiograms taken during hypothermia show fairly constant changes. In a series of 9 patients, Kossman²⁵ noted an alteration in the form of the final ventricular deflection and a prolongation of electrical systole. A high take-off of the T waves and a diphasic T₂ have also been reported. During recovery, the QT interval does not return to normal immediately; in fact, several days may elapse before this occurs. Tomaszewski²⁶ has re-

ported detailed observations on a man, aged fifty-four, who suffered from accidental exposure to the cold, but did not die until after he had been observed for several hours in the hospital. When he was seen first his heart rate was 21 per minute. Before death, the rate increased to 44. The electrocardiogram showed prolongation of the PR interval, low voltage and delayed conduction time. At autopsy, no significant morphologic changes in the heart were detected. In the dog, Otto²⁷ observed inversion of the T waves after chilling of the right ventricle with ethyl chloride, and a high take-off of the T waves after chilling of the left ventricle.

The formed elements of the blood undergo as diverse variations from normal as the cardiovascular system. If the fluid balance is not maintained, hemoconcentration follows with an increase in red-cell count as great as 25 per cent above normal.²⁸ The white-cell count increases several-fold with a rise in the percentage of polymorphonuclears. The percentage of reticulocytes also increases.² The sedimentation rate and the platelet count decrease. Within forty-eight hours after restoration of body temperature, the sedimentation rate returns to the pretreatment level.²⁰

Scattered observations have been made on the chemical constituents of the blood. In view of the statement by Smith and Fay⁹ that renal function ceases during hypothermia, it is of particular interest to inquire into the concentration of non-protein nitrogen of the blood. Vaughn² observed a significant decrease in this constituent in 4 out of 6 patients during treatment. In 2 patients, there was an increase. Bernhard²⁰ observed an increase in 2 patients only, and no change in the remaining 24 of his series. The other constituents that have been studied—calcium, phosphorus, chloride and cholesterol—show no significant change during treatment.

Routine urine analyses for albumin, sugar and formed elements are negative.

Since the hibernating animal has a metabolic rate below normal it seems reasonable to expect that in human beings during general hypothermia a similar depression of this function might be detected. Patients with metastatic cancer who are given therapeutic amounts of sedatives periodically during the treatment show such a depression.²⁰ If the cold alone is relied on for sedation, it is possible that the rate may be unchanged or above normal. A final decision in this matter must await further investigation. Obviously, it is desirable to learn how important an altered oxygen consumption is in the production of the therapeutic and physiologic effects described.

Pupillary reflexes disappear in human beings during hypothermia²¹ as they do in animals¹⁴; crossed tibial reflexes and the absence of plantar response have been observed. The loss of nerve conduction appears to be a direct effect of cooling.²² During recovery a restoration of the abnormal responses occurs.

Hypothermia offers an interesting opportunity for the study of shivering. All patients shiver shortly after exposure to the cold environment unless they are heavily sedated. Fay¹ observed a disappearance of shivering when the temperature fell below 90°F. This has not been our experience with patients who have been given no drugs after the induction anesthesia. We have observed patients to shiver intermittently as the temperature fell to as low as 75°F., just as animals shiver at low temperatures.^{33,34} On the return toward normal temperature, shivering is less violent. There are two explanations for the individual variation in shivering. I am inclined to attribute cessation of shivering in Fay's series to the periodic use of sedatives. Hypoglycemia is another antishivering agent. In the dog, insulin may abolish shivering due to cold.²⁹ It is possible that some patients develop spontaneous hypoglycemia during hypothermia, and shivering is subsequently inhibited.

Burton and Bronk³⁵ noted two types of muscle tremors in the anesthetized cat following cooling. When the rectal temperature fell below 93°F., intermittent and inco-ordinated twitches of single units appeared. A rise of oxygen consumption followed shortly. The response appeared first in the muscles of the head and thorax, then in the superficial pelvic muscles, and lastly in the deep muscles of the extremities. The response of a given muscle increased in regularity by the number of active units, and in frequency from 5 to 12 per second. Later, co-ordinated grouping of discharges appeared and resulted in gross tremors, and shivering (11 per second). A single unit discharged only once in each group. That a similar phenomenon occurs in human beings was mentioned as a possibility by Denny-Brown and his associates.³² Undoubtedly, further study of hypothermia will clarify this matter.

THERAPEUTIC CONSIDERATIONS

General hypothermia has been used for the treatment of several conditions. These include intractable pain, cancer, morphine addiction, leukemia and schizophrenia. The treatment was devised originally for patients suffering from cancer. Although definite regressive changes in undifferentiated cell growth in deep metastatic lesions have not been observed consistently, hypothermia has

a place in the treatment of selected patients suffering from neoplasias. Relief of pain may well be the most important therapeutic gain, and all observers who have reported on the subject are in agreement concerning this effect. So successful has it been that Fay¹ no longer considers narcotics necessary in the treatment of intractable pain and "operative intervention for pain [chordotomy and rhizotomy] has not been required during the past two years."

Approximately two thirds of the patients who complain of pain and who submit to hypothermia experience reasonably prolonged periods of relative or complete freedom. There are several cases in which patients who required several grains of morphine daily for control of pain before treatment became quite free from pain, without opiates, following hypothermia. Systematic relief appears to be independent of the location of the tumor. Pain secondary to new growths of the brain, antrum, buccal cavity, thyroid gland, breast, lung, stomach, sigmoid, rectum, kidney, adrenal gland, testis, prostate, bladder, cervix, vulva or skin has responded. The duration of relief varies. Some patients are helped for only a few days; others may remain symptom free for as long as four months. The effect of cold on pain is noteworthy and clinically important.³⁸ Precisely why the anesthetic effect on the sensory nerves should persist for several months is not understood.

Not only does pain associated with tumors respond, but simultaneously, regressive changes in neoplastic tissue have been evident on microscopic examination. The response of sarcoma is less striking than that of carcinoma. The more undifferentiated the carcinoma, the more rapid is the regressive phenomenon. Primary tumors as well as lymph nodes that have been invaded have undergone diminution in size. In certain patients with tumors of the gastrointestinal tract, the regressive changes have been so extensive that the tumor has sloughed out of the wall of the involved region, with the development, later, of peritonitis.

It is advisable to inquire whether general hypothermia increases the rate of growth of tumor tissue or damages normal tissue. No evidence has been accumulated to suggest that the rate of growth of tumor tissue is accelerated. So long as the temperature is reduced, any effect on growth is retardative. Similarly, it has been shown that significant cell changes in normal tissues are most infrequent.

Probably more important than general hypothermia in the treatment of cancer is the use of local hypothermia. The application of cold locally

in the treatment of tumors was discussed by Cooke as early as 1865³⁹ as follows:

Cold, by means of ice applied with great caution, has its uses. It subsides those occasional inflammatory paroxysms to which scirrhus tumor is prone, and may check the disposition to suppuration, the result of inflammatory action. Its constant use, however, in all states of the tumor is not warranted by experience. The destructive power of this agent is so great, that I have seen the whole breast slough as a result of the prolonged application of ice, and the sloughing, in the instance I refer to, extended through the intercostal muscles into the cavity of the chest.

Recent studies have shown that regressive changes are most obvious when local hypothermia can be carried out at a temperature between 40 and 50°F.²¹ Special fitting coils through which a refrigerant circulates are applied. As observed by Cooke, necrosis of tumor tissue may follow. Rarely, there may be complete disappearance of tumor cells as observed histologically in successive biopsies. It has been observed in some patients who succumbed to the cancer and who came to autopsy that the treated primary site was quite free of tumor cells.

McCravey⁴⁰ has reported favorable results with local hypothermia in 5 cases of carcinoma of the bladder. By marsupializing and exteriorizing the bladder cavity, especially designed metal applicators were enabled to enclose partially the lesion and bladder cavity. In each patient on whom this was carried out, the local bladder tumors were reduced in size or destroyed, all or in greater part, within from six to twelve weeks. The deeper extension of such tumors when it had not been possible to maintain accurately the desired temperature showed regressive changes, but some tumor tissue persisted. In all cases the patient's life was prolonged beyond that expected for a patient not treated with hypothermia.

The phenomenon of regression has been summarized by Smith and Fay.¹⁹

Granular hydropic and fatty degenerative changes may be observed in the cytoplasm of the cells, depending largely on their individual character and origin. In many instances the ratio of nucleus to cytoplasm is so distorted that little evidence of cytoplasmic change can be observed. The cytoplasmic changes are followed by or associated with nuclear degeneration. More frequently pyknotic condensation of the nucleus occurs, ending in actual rupture of the nuclear membrane. It has been our experience, as has already been indicated, that the more undifferentiated such tumor cells are, especially if they belong to the epithelial series, the more rapid and extensive are the regressive phenomena. Histologically, the effects of this physical agent, cold, are not so unlike the effects of that physical agent which has been more carefully studied in respect to cell changes, roentgen radiation.

It is possible that radiation combined with cold⁴¹ might be a more effective agent than either one alone, just as cold renders plant cells more sensitive to radiation.

It is difficult to reconcile these observations of the effect of cold with other experimental observations in the literature, particularly those that concern the behavior of animal tumors. Lambert⁴ showed that cancer cells are more resistant to cold than cells of the normal adult. Aulcr and his associates⁴² exposed the Flexner carcinoma and the Jensen sarcoma of the rat to temperatures as low as 32°F. The tumors were then transplanted. Most of the transplants grew. It was assumed that the tumors formed sporadic cells that were resistant to the cold. Tumor transplants were killed at a temperature from 70 to 98°F were more successful than those maintained at 98°F. Bischoff and his associates⁴³ studied sarcoma No. 180 in 29 mice. The body temperature of the animals was reduced as low as 65°F. No permanent effect on the growth process was noted.

Several patients suffering from leukemia have been treated by hypothermia. Reich²⁸ has reported 2 such cases. One patient was in the terminal stages of aleukemic lymphoblastic leukemia. No changes attributable to the treatment were observed. The second patient was suffering from acute myeloblastic leukemia. The total white cell count decreased from 50,000 to a normal level during each treatment, and remained within the normal range for several days. No change in the differential count—95 per cent myeloblasts—was observed. The diminution in the white-cell count of patients with leukemia is quite the reverse of the process observed in patients who present no disturbance of white-cell economy.² That further investigation of the use of hypothermia in leukemia is indicated seems obvious.

Closely associated with the relief of pain is the treatment of morphine addiction. Patients with cancer who have required large amounts of opiates for relief of pain before general hypothermia have been able to live afterward without such drugs for several months. In others, smaller doses of sedatives than formerly have been required to control symptoms. Similarly, morphine addiction per se has responded to general hypothermia. Most patients require only one period of a few days for a favorable therapeutic effect.

The use of cold in diminishing the undesirable effects of intoxication has been appreciated for some time. This is evident from a description reported in 1803.⁴⁵

A Gentleman of this Island whose name was Weeks, a great votary of Bacchus, was in the practice from fifteen to twenty years, of plunging into cold water

when he rose from his bottle, and of actually going to sleep in a trough full of water, with his head supported on a kind of wooden pillow made for the purpose, above the surface. When he dined abroad and had not the convenience of his own trough he used to strip off his coat, waistcoat, and shirt, and sit exposed in the open air, and in that situation go to sleep, whether it rained or not. And sometimes he went and bathed in the nearest adjoining pond, to which he generally required assistance to be conveyed. The effect of this practice was, that instead of experiencing debility, lassitude, headache, and nausea, he found himself on awakening cheerful and refreshed, and free from all the effects of intoxication. In the year 1789, during one day abroad he got alternately drunk and sober three times before midnight each time recovering his sobriety by himself by immersing himself, and sleeping in cold water, and on awakening returning to the company. The last time after supper, he was so immoderately intoxicated, that he insisted on his companions undressing him and conveying him themselves to the pond. They carried him accordingly in a chair, and set him up to the chin in water, where he continued upwards of an hour, a person supporting him. I heard this last circumstance from a gentleman, one of the party, whose veracity may be entirely depended on.

At home, however, he used, as I have already mentioned, a trough made for the purpose, with a bench in it as a pillow, having been nearly drowned when sleeping in his pond, from the negro who was appointed to watch him, having himself fallen asleep. In this watery bed he would sleep, one, two, three, or even more hours, experiencing always the greatest refreshment. His wife and family, when they wished him to change his quarters used to draw out the plug, and let the water run off when he awoke and humorously complained of the loss of his bed clothes. At length this expedient began to lose its effect in rousing him and one time, he continued to sleep in an empty trough. In consequence of this, he was seized with extreme rigors and chills, followed by a severe attack of rheumatism, which affected him a long time, and made him desist from the practice in the future. But to the end of his life he was in the habit of sitting, when intoxicated, with his clothes open, and sometimes quite naked, exposed to the wind and the rain. This extraordinary character died of apoplexy about three weeks ago, aged sixty three.

In recent months Dr. Tillotson and I have studied the effects of hypothermia on patients suffering from schizophrenia.⁶ Ten patients were studied, 4 of whom were subjected to two or more periods of general hypothermia. Most of the patients had been treated previously with insulin or Metrazol, or both, without benefit. All those who were older than thirty years and who had been confined to a mental hospital for a long time, showed little or no prolonged alteration in their mental symptoms. On the other hand, of those who had been sick for less than three years all except one showed a recrossing alteration in their clinical courses. In 4 patients the improvement has been striking and continuous for six months. In 3, marked temporary improvement was noted.

It is appreciated that the total number of patients is small, but with promising results, continued efforts are justified.

OTHER CONDITIONS TO BE INVESTIGATED

The conditions discussed above may serve little else than to introduce the subject of therapeutics by hypothermia. The field of possibilities for the future may be large. The reader, undoubtedly, has visioned benefit in such disturbances as Hodgkin's disease, lymphogranuloma venereum, subacute bacterial endocarditis, parasitic diseases, undulant fever, chronic arthritis, acquired syphilis, acute toxic psychoses, tetanus, multiple sclerosis, intractable migraine and encephalitis.

SUMMARY

Observations on the experimental reduction of the internal temperature of the body as well as local application of cold constitute the basis of this report. A discussion of hypothermia is timely because the physiologic changes and therapeutic implications associated with it have begun to be studied systematically only of late. During general hypothermia the internal body temperature may be lowered to 75°F. with subsequent recovery. It may be maintained continuously between 80 and 90°F. for as long as eight days. If local application of cold is employed, a circumscribed area of the body may be maintained between 40 and 50°F. for several months without damage or destruction of normal tissue.

Relief of pain is probably the most important single effect of general hypothermia in patients with metastatic cancer. Regressive changes in tumor tissue have been reported following prolonged general hypothermia, but are observed more constantly following prolonged local hypothermia. Other conditions that have appeared to benefit from general hypothermia include morphine addiction, leukemia and schizophrenia.

It should be appreciated that knowledge in the field of hypothermia is most fragmentary and that until a large amount of painstaking labor is expended, a full and comprehensive understanding of all the related facts will not exist.

REFERENCES

1. Fay, T. Observations on prolonged human refrigeration. *New York State J. Med.* 40:1351-1354, 1940.
2. Vaughn, A. M. Experimental hibernation of metastatic growths: preliminary report. *J. A. M. A.* 114:2293-2298, 1940.
3. Gerster, J. C. A. General cryotherapy: a symposium. Rationale and description of method; selection of cases; conditions treated. *Bull. New York Acad. Med.* 16:312-316, 1940.
4. Sauer, P. K. General cryotherapy: a symposium. Clinical manifestations: general observations; pain relief; mortality; local cryotherapy. *Bull. New York Acad. Med.* 16:334-338, 1940.
5. Solente, G. La cryothérapie et les bases de sa technique. *Bull. méd.* 41:522, 1927.
6. Talbot, J. H. and Tillotson, K. J. unpublished data.
7. Fay, T. and Henny, G. C. Correlation of body segmental temperature and its relation to the location of carcinomatous metastasis: clinical observations and response to methods of refrigeration. *Surg., Gynec. & Obst.* 66:512-524, 1938.
8. Coley, B. L. and Higinbotham, N. L. Tumors primary in the bones of the hands and feet. *Surgery* 5:112-128, 1939.
9. Smith, L. W. and Fay, T. Temperature factors in cancer and embryonal cell growths. *J. A. M. A.* 113:653-660, 1939.
10. Reincke, J. J. Beobachtungen über die Körpertemperatur Beirunkener. *Deutsches Arch. f. klin. Med.* 16:12-18, 1875.
11. Nicolaysen, J. Stærk synkning af legemsvarmen som følge af forfrysning. *Norsk mag. f. lægevidensk.* 5:44-48, 1875.
12. Simpson, S. and Herring, P. T. The effect of cold narcosis on reflex action in warm-blooded animals. *J. Physiol.* 32:305-311, 1905.
13. Walther, A. Beiträge zur Lehre von der thierischen Wärme. *Virchows Arch. f. path. Anat.* 25:414-417, 1862.
14. Simpson, S. Some observations on the temperature of the monkey. *J. Physiol.* 28:xxi-xxiii, 1902.
15. Parker, G. H. General anesthesia by cooling. *Proc. Soc. Exper. Biol. & Med.* 42:186, 1939.
16. Kuenzel, W. and Todd, T. W. Studies in the alimentary tract of man. IV. The reflex effect of heat and cold upon gastric responses. *J. Lab. & Clin. Med.* 15:132-141, 1929.
17. Sleeth, C. K. and Van Liere, E. J. The effect of environmental temperature on the emptying time of the stomach. *Am. J. Physiol.* 118:272-275, 1937.
18. Foord, A. G. The effect of exposure to cold on antibody production. *J. Infect. Dis.* 23:159-168, 1918.
19. Smith, L. W. and Fay, T. Observations on human beings with cancer, maintained at reduced temperatures of 75°-90° Fahrenheit. *Am. J. Clin. Path.* 10:1-11, 1940.
20. Smith, L. W. Pathologic changes observed in human tissues subjected to subcritical temperatures. *Arch. Path.* 30:424-439, 1940.
21. *Idem.* Refrigeration in cancer: pathologic observations in 100 advanced cases. *New York State J. Med.* 40:1355-1361, 1940.
22. Oppenheimer, M. J. and McCravery, A. Circulation time in man at low temperatures. *Am. J. Physiol.* 129:434, 1940.
23. Harkins, H. N. and Hudson, J. E. Shock due to freezing. II. Composition of edema fluid. *Proc. Soc. Exper. Biol. & Med.* 32:434, 1934.
24. Harkins, H. N. and Harmon, P. H. Experimental freezing: bleeding volume, general and local temperature changes. *Proc. Soc. Exper. Biol. & Med.* 32:1142, 1934.
25. Kossman, C. E. General cryotherapy: a symposium. Cardiovascular aspects. *Bull. New York Acad. Med.* 16:317-320, 1940.
26. Temaszewski, W. Changements électrocardiographiques, observés chez un homme mort de froid. *Arch. d. mal. du cœur* 31:525-528, 1938.
27. Otto, H. L. The action of cold upon the T-wave of the electrocardiogram. *J. Lab. & Clin. Med.* 14:718-721, 1929.
28. Reich, C. General cryotherapy: a symposium. Hematology. *Bull. New York Acad. Med.* 16:321, 1940.
29. Bernhardt, A. General cryotherapy: a symposium. Blood chemistry. *Bull. New York Acad. Med.* 16:322, 1940.
30. Geiger, J. General cryotherapy: a symposium. Basal metabolism determinations. *Bull. New York Acad. Med.* 16:323, 1940.
31. Davis, T. K. General cryotherapy: a symposium. Neurological observations. *Bull. New York Acad. Med.* 16:324, 1940.
32. Bickford, R. G. The fibre dissociation produced by cooling human nerves. *Clin. Sci.* 4:159-165, 1939.
33. Britton, S. W. Extreme hypothermia in various animals and in man with notes on the detection of life and the possibility of recovery in cases of apparent death from exposure to cold. *Canad. M. A. J.* 22:257-261, 1930.
34. Troedson, B. S. Experimental lowering of the body temperature of rabbits and its possible application in man. *Arch. Phys. Therapy* 20:501-504, 1939.
35. Cassidy, G. J., Dworkin, S. and Finney, W. H. Insulin and the mechanism of hibernation. *Am. J. Physiol.* 73:417-428, 1925.
36. Burton, A. C. and Bronk, D. W. The motor mechanism of shivering and of thermal muscular tone. *Am. J. Physiol.* 119:284, 1937.
37. Denny-Brown, D., Gaylor, J. B. and Uprus, V. Note on the nature of the motor discharge in shivering. *Brain* 58:233-237, 1935.
38. Fay, T. and McCravery, A. Pain relief by local and generalized refrigeration. *Dis. Nerv. System* 1:209-211, 1940.
39. Cooke, T. W. *On Cancer: its allies and counterfeits.* 226 pp. London: Longmans, Green and Co., 1865.
40. McCravery, A. Treatment of tumors of the bladder by refrigeration. *New York State J. Med.* 40:1435-1440, 1940.
41. Mottram, J. C. On the skin reactions to radium exposure and their avoidance in therapy: an experimental investigation. *Brit. J. Radiol.* 29:174-180, 1924.
42. Lambert, R. A. The effects of cold on animal tissues. *Proc. New York Path. Soc.* 12:113-121, 1912.
43. Auler, H., Koeniger, W., Schlottmann, H., Bylina, S. and Schmidt, H. Ueber die Kälteresistenz bösartiger Zellen. *Ztschr. f. Krebsforsch.* 47:371-381, 1938.
44. Bischoff, F., Long, M. L. and Rupp, J. J. Influence of induced hibernation on mouse sarcoma 180, with histologic reports. *Am. J. Cancer* 39:241-244, 1940.
45. Currie, J. *Medical Reports on the Effects of Water, Cold and Warmth as a Remedy in Fever and Febrile Diseases.* Fourth edition. Vol. 1. 379 pp. London: T. Cadell & W. Davies, 1805. P. 294.

CASE RECORDS OF THE
MASSACHUSETTS GENERAL HOSPITALANTE MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27071

PRESENTATION OF CASE

A sixty-three-year-old unmarried woman entered the hospital complaining of abdominal pain and jaundice.

Since the patient was drowsy and not cooperative, the history was obtained largely from her relatives. It appeared that from early womanhood she had suffered from "bilious attacks" characterized by indigestion, nausea and vomiting. In more recent years the attacks had become more numerous and were accompanied by upper abdominal pain, which the patient was unable to localize accurately. These episodes were not accompanied by jaundice, chills or fever. Two weeks before admission she suffered a severe attack of upper abdominal pain accompanied by persistent nausea and vomiting, two chills and fever. She noticed that her stools were light in color and her urine dark, and one week after the onset of abdominal pain, marked jaundice appeared, with severe pruritus. At the time of admission the jaundice was subsiding, but the nausea persisted. Her appetite had always been good until the onset of her present illness.

It was stated that the patient had had jaundice once as a child and rheumatic fever at twenty five with "a little heart damage," but no recurrence. When the patient was fourteen, her mother died of what was said to be "consumption."

On examination the patient was a well-developed, obese woman whose skin was dry, scaly and markedly jaundiced. The pupils were small and regular, and reacted to light and accommodation, the scleras were jaundiced. The skin of the abdomen, flanks and upper thighs was excoriated, and contained a number of slightly raised, red dish papules. There was a diffuse reddening of the nasopharynx, with a mucopurulent exudate. Examination of the heart was negative; the blood pressure was 135 systolic, 68 diastolic. There was slight dullness to percussion, with many fine rales on auscultation at both lung bases. The abdomen was obese and pendulous, and a tender, vague mass was palpated in the right upper quadrant, extending medially into the epigastrium. Rectal examination was negative.

The temperature was normal, the pulse 90, and the respirations 30.

Examination of the urine showed a + test for albumin and a + bile reaction, with 20 white blood cells per high power field.

Examination of the blood showed a red-cell count of 4,200,000 with a hemoglobin of 11.9 gm. (photoelectric cell technic), and a white-cell count of 61,000 with 98 per cent polymorphonuclears. A van den Bergh showed 40 mg. of bilirubin per 100 cc. of serum, biphasic. The prothrombin time was 31 seconds (normal, 16 seconds), and the hematocrit reading 39.4 per 100 cc. The non-protein nitrogen of the blood serum was 130 mg. per 100 cc., the serum protein 5.6 gm. per 100 cc., and the blood chlorides 966 milliequiv. per liter.

X-ray films of the abdomen, taken with a portable machine, were not entirely satisfactory because of the patient's size, but no definite abnormalities were noted. The right side of the diaphragm was probably elevated.

The patient was given intravenous fluids and one 500 cc. blood transfusion. On the third hospital day the white cell count had fallen to 41,800, and the nonprotein nitrogen to 100 mg. per 100 cc., but the prothrombin time had risen to 43 seconds. Seven days after admission the temperature was 100°F. and the following day had risen to 102. On the ninth hospital day the patient was operated on. A 15 cm. incision was made in the right upper quadrant of the abdomen. Numerous fresh adhesions were encountered, and there was a sudden gush of thick, greenish black bile from what was presumably an old, friable, gangrenous gall bladder. Everything was gently palpated, and no stones could be felt. Further exploration was deemed inadvisable, and one rubber tube was sewn into the gall bladder and a cigarette wick placed beside it. The wound was closed carefully, using silk for the fascia.

Postoperatively the patient's condition remained precarious, the temperature averaging 100.2°F.; the wound drained small amounts, never more than 15 cc. of bile-stained fluid. She was given daily intravenous injections of 1500 cc. of 75 per cent glucose in physiologic saline solution and many blood transfusions. Five days postoperatively she had a chill and complained of a sharp substernal pain. On examination her color was ashen, and she responded poorly. The temperature was 104°F., the pulse 122, weak and irregular; the blood pressure was 96 systolic, 60 diastolic. Respirations were 27, and were groaning and shallow. There was bronchial breathing with dullness at the left base, and bilateral basal rales. The patient was placed in an oxygen tent, but death

occurred the following day. Latterly the nonprotein nitrogen rose to 110 mg. per 100 cc., and the serum van den Bergh dropped to 6.4 mg. of bilirubin per 100 cc.

DIFFERENTIAL DIAGNOSIS

DR. LELAND S. MCKITTRICK: May we see the x-ray films?

DR. RICHARD SCHATZKI: The portable films are very unsatisfactory, as the record states. There is a little more to be seen on the films than stated in the record. There are areas of atelectasis in both lower lung fields. One cannot see the spleen. There are no visible gallstones, but gallstones would have to be fairly large to show in a film of this quality.

DR. MCKITTRICK: Thank you. The films do not confuse me more than the written report, and that is always a help.

Here is the story of a sixty-three-year-old woman the early part of whose history I cannot make much out of and have to disregard. I do not know what is meant by "bilious attacks." As I listen to patients complaining of "biliousness," they are just as apt to use this term for episodes of migraine as for gall-bladder attacks. In more recent years the attacks became more frequent. There were no chills, jaundice or fever, but the patient did have abdominal pain at about that time, and it is possible that the bilious attacks were attacks of pain. Otherwise she was perfectly well until two weeks before admission to the hospital, and we are therefore dealing with an acute process, consisting of a sudden severe attack of upper abdominal pain accompanied by persistent nausea and vomiting, two chills and fever. The stools became light in color and the urine dark, and one week after the onset of abdominal pain, marked jaundice with pruritus appeared. If one takes the recorded facts,—progressively frequent attacks of indigestion, some with pain, culminating in a sudden severe attack of pain, chills, fever, light-colored stools, dark urine and jaundice,—then I think one might rightfully assume that the patient had gallstones, that one or more stones had dropped into the common duct, and that she had in addition a cholangitis.

On physical examination she was found to be very obese, to be severely jaundiced, to have excoriations secondary to the itching that goes with jaundice, and to have a big mass, palpable in the right upper quadrant, which extended medially into the epigastrium. The temperature was normal, and the white-cell count was 61,000 with a little secondary anemia. Presumably there was no blood dyscrasia because 98 per cent of the white

cells were polymorphonuclears. She had a very high bilirubin: 40 mg. There was a rapid prothrombin time, an elevated nonprotein nitrogen, a slightly lowered serum protein, and a normal blood chloride. The picture at this point becomes confusing, because she became drowsy and the nonprotein nitrogen rapidly climbed to 130 mg. per 100 cc. Despite the normal temperature, the white-cell count remained notably high. The urine showed a + test for albumin. I am impressed with the rapid prothrombin time only two weeks after the onset of an apparently acute process. It seems to me that such a patient must have something more than can be explained on the basis of a common-duct stone, with or without an acute gall-bladder condition. I am inclined to believe that the drowsiness, the high nonprotein nitrogen and the early development of a rapid prothrombin time are evidences that, in addition, she must have had a good deal of liver damage due to acute hepatitis or perhaps hepatic insufficiency.

I shall assume that she had gallstones, but that that is not the whole story. A number of other conditions must be considered, but there is not time to discuss all of them in detail. The disproportion between the temperature and white-cell count in a patient who is so sick so soon after the onset of symptoms makes one think of acute pancreatitis in association with a common-duct stone. However, the evidence is so much in favor of hepatic insufficiency and the findings are so definitely right-sided that I should prefer some other explanation. A pylephlebitis is, I presume, a definite possibility, but I should not be able to make this diagnosis. I should operate on the assumption that she had gallstones. I believe that she had a stone in the common duct and cholangitis, and for the reasons already described, severe intra-hepatic disease. To explain the mass in the right upper quadrant I should have assumed a large, distended gall bladder, but in view of the additional information obtained at operation there must have been a perforation, and this probably represented an abscess in relation to the gall bladder and adjacent structures. Even though no stones were found at operation, I assume that they were present.

I do not see how one can be certain why the patient died so suddenly. She had a rapid prothrombin time, but she had a lot of transfusions, and one would have thought that the transfusions would have controlled any bleeding tendency. She might have had a pulmonary embolus. I do not think that was the cause of her death. Progression of the biliary-tract disease might well have been enough.

I should hate to give the impression that I have any confidence at all in my interpretation of these findings. I simply believe that the patient had gallstones, in addition to something more to explain this picture, and I should like to put all the emphasis on the liver. Whether or not she had pancreatitis I do not know, but I doubt it.

DR. HORATIO ROGERS: If you account for the mass on the basis of abscess, you still leave the discrepancy between the temperature and white-cell count not accounted for.

DR. MCKITTRICK: Yes; I have not been able to account for it entirely. Of course this patient was not absolutely afebrile; the temperature was slow to climb, but did start up at the end of a week in the hospital.

DR. RICHARD WARREN: Dr. Richard H. Miller operated on this patient but could not be present today. We went through the same course of reasoning as Dr. McKittrick, but without arriving at such a concrete decision. She was sent in with a diagnosis of stone in the common duct, and for the first day or so, we assumed that that was what she had. The more we thought the story over, — the normal temperature, the elevated white-cell count and the fact that she had bile in the stools, — the more the whole preoperative picture confused us. The mass, which was not palpable when she first arrived, appeared during the nine days preceding operation. The question was whether to operate and when I might say, in justification of the operation, that the prothrombin time had dropped to 20 seconds by the day of operation and the nonprotein nitrogen to 60 mg, so that she was not quite so sick as the data in the abstract indicates. At operation the mass that we came down upon was assumed at first to be the gall bladder, but it was not in the gall-bladder fissure, because the falciform ligament was definitely coming out in that area. Since the patient was in such poor condition, and since bile drained freely from this cavity, a tube was inserted in it for drainage, and nothing further done.

CLINICAL DIAGNOSES

Acute pancreatitis.
Auricular fibrillation.

DR. MCKITTRICK'S DIAGNOSES

Cholelithiasis, with acute cholecystitis and pericystic abscess.
Choledocholithiasis.
Cholangitis.
Acute hepatitis, with hepatic failure.

ANATOMICAL DIAGNOSES

Choledocholithiasis.
Acute cholangitis.
Multiple abscesses of the liver.
Pulmonary edema.
Icterus.
Operative wound: drainage of liver abscess

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: At autopsy it was still impossible to identify the gall bladder. There was a large abscess in and beneath the liver in the region of the falciform ligament, and the drain had been placed in this abscess. There was a stone in the common duct that completely obstructed it. Above the stone the biliary system was markedly dilated; below, the duct was narrow, and in fact there appeared to be a definite stricture extending from the stone down 25 cm. to the ampulla. The liver was enlarged, and on section was found to contain many abscesses filled with deeply green-stained purulent material. Many of these abscesses could be traced to definite contiguity with the dilated biliary radicles. Cultures showed hemolytic streptococci. This extensive intrahepatic cholangitis was probably the chief cause of death. There was a story of rheumatic heart disease in childhood, and although the mitral valve itself seemed negative, we found some calcification of the annulus fibrosus of the ring — a somewhat unusual lesion, though not an extremely rare one.

The lungs showed atelectasis and extensive edema, but almost no pneumonia.

A PHYSICIAN: What about the kidneys?

DR. MALLORY: The autopsy was done rather long post mortem and showed something that we frequently see in heavily jaundiced patients, occasionally in some other conditions: a sort of lysis of connective tissue throughout the body. The liver cells in such cases fall into jumbled masses, owing to disappearance of the reticulum. The same thing was apparent in the kidneys and the voluntary muscles. The sections are worthless to look at. One cannot possibly say whether or not she had nephritis.

CASE 27072

PRESENTATION OF CASE

A fifty-five-year-old housewife entered the hospital complaining of vaginal bleeding.

The patient's menstrual periods had always been regular until six years before admission, when they increased to twice a month and she noticed the occurrence of frequent hot flashes.

After a year their character changed to small hemorrhages of bright-red blood lasting a week or longer, with staining for four or five days thereafter. Three years before entry the patient suffered a profuse hemorrhage, which lasted a week. She was admitted to another hospital, where an unstated operation was performed, which included, however, an appendectomy, right herniorrhaphy and hemorrhoidectomy. After this procedure, occasional gushes occurred, with staining for four or five days once a month. One year before admission the vaginal bleeding again became profuse, and during the last two months before entry, staining was noticed every day. The hot flashes had disappeared, but she complained of easy fatigability and exertional dyspnea, with occasional dizzy spells when walking. The patient had had two children and one miscarriage.

She had had the usual childhood diseases. The family history was noncontributory.

On examination the patient was very obese and did not appear ill. Examination of the heart and lungs was negative; the blood pressure was 160 systolic, 80 diastolic. Examination of the abdomen showed old surgical scars in the midline and in the right lower quadrant. On palpation it was difficult to feel the uterus, but a large mass believed to be the uterus could be felt bimanually and per rectum. The cervix was slightly eroded, but otherwise negative.

The temperature, pulse and respirations were normal.

Examination of the urine showed a ++ test for albumin, with 40 white blood cells per high-power field, and many bacteria. Examination of the blood showed a red-cell count of 4,100,000. A blood Hinton test was negative.

An operation was performed on the second hospital day.

DIFFERENTIAL DIAGNOSIS

DR. MARSHALL K. BARTLETT: Of course, we should like to know what was found in the abdomen three years before admission, when the previous operation was performed. I think we must assume that if any significant lesion had been found in the pelvic organs and any of them had been removed, we should have been informed about it.

In a woman of fifty-five with vaginal bleeding the first decision to be made is whether the bleeding is due to cancer. There is nothing in the record on which I can make that decision. We can be reasonably certain that the bleeding was not from a malignant lesion in the cervix on the basis of the pelvic examination. Did she have carci-

noma of the endometrium? I do not believe it would give a tumor that would be described, as this is, as a large mass. As you all know, the uterus becomes somewhat enlarged, but it would not be described as a large tumor, unless there was extension into the surrounding structure. Then a large mass might be present, but I think that would be recognized by fixation and so forth. Is this a tumor of the ovary, or is it a fibroid tumor of the uterus? I do not see that we can tell. It is frequently impossible to decide, even when one can examine the patient personally, and I can only accept their statement that it was thought to be uterus, although I see no way of ruling out ovarian tumor. I shall assume that the tumor was in the uterus. In that case the most likely thing would be a fibroid or multiple fibroids, which could account for the bleeding, but it would not necessarily rule out carcinoma of the endometrium in addition. In a considerable number of cases, endometrial carcinoma is found in uteri that contain fibroids. The best conclusion I can come to is that the patient had fibroids of the uterus; there is the possibility that she had carcinoma of the endometrium in addition.

DR. TRACY B. MALLORY: What would your procedure be?

DR. BARTLETT: A diagnostic curettage, a frozen section and a laparotomy should be performed.

DR. MALLORY: Are there any other suggestions?

DR. JOE V. MEIGS: What do the hot flashes mean?

DR. BARTLETT: I suppose she had begun to have the menopause.

DR. MEIGS: They came and went. It makes one think of some ovarian dysfunction.

DR. BARTLETT: Yes.

DR. MEIGS: The intermittent hot flashes bring up the question of an endocrine disturbance such as a physiologic cyst. In a person who has any sort of functional cyst or tumor of the ovary you may see just such a thing. When the estrin is high enough, the patients lose their flashes, and when it is not, they have them. It is a possibility.

DR. BARTLETT: It is a possibility; I had not thought of it. If that were so the endometrium would give a picture to confirm the diagnosis.

DR. MEIGS: At fifty-five she might have a granulosa-cell tumor, with active endometrium but probably no hot flashes. The hot flashes disappear with the development of this particular tumor.

DR. BENJAMIN CASTLEMAN: How about the staining every day? What does that mean?

DR. MEIGS: It might mean a polyp in the endometrium. She might have had either carcinoma or functional bleeding.

CLINICAL DIAGNOSIS

Adenocarcinoma of the uterus

DR. BARTLETT'S DIAGNOSES

Fibroids of the uterus.

Endometrial carcinoma?

ANATOMICAL DIAGNOSIS

Polypoid adenocarcinoma of the uterus, Grade I

PATHOLOGICAL DISCUSSION

DR. MALLORY: A curettage was done on this patient and very abundant material obtained that looked grossly very much like carcinoma. The frozen section was not particularly helpful; the material was composed of such well-differentiated glands that it was difficult to decide whether it was a polypoid carcinoma or simply an atypical polyp. The outstanding feature, however, was the fact that there was no stroma,—each gland backed up against the next gland without any intervening stroma,—and on that ground a diagnosis of cancer was considered justified. A hysterectomy was done. The ovaries, as well as the tubes, were small and atrophic on both sides. The uterus was considerably enlarged—about twice the normal size, I should say. The entire fundus was filled with a papillary tumor that showed very

slight invasion of the myometrium. How long the tumor may have been present, there is no way of guessing.

DR. MEIGS: Do you think that a polypoid type of hyperplasia does become malignant? Novak* states that there is often hyperplasia with adenocarcinoma

DR. CASTLEMAN. We have had two or three cases with hyperplasia and carcinoma in different parts of the same uterus, and this would fit in with Novak's idea.

DR. MALLORY: I cannot remember a case showing simple hyperplasia on curettage that came back two or three years later with carcinoma.

DR. MEIGS: This particular case suggests that there might have been such a development starting six years before.

DR. FRANKLIN G. BILCH, JR.: What are your ideas at the present time, knowing that this was carcinoma, in regard to immediate surgery versus x-ray treatment?

DR. MEIGS: If you have a perfect radium setup, use it, and then operate. By a perfect setup I mean the proper way to apply it; we have it nowhere around Boston except at the Pondville Hospital.

*Novak E and Yui E. Relation of endometrial hyperplasia to adenocarcinoma of the uterus. *Am J Obst & Gynec* 32:674-678 1936

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of
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SUBSCRIPTION TERMS: \$6.00 per year in advance, postage paid, for the United States; Canada, \$7.04 per year; \$8.52 per year for all foreign countries belonging to the Postal Union.

MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

INFLUENZA

DURING the great pandemic of 1918-1919, the number of deaths from influenza throughout the entire world was greater than the total number of persons killed in the five years of World War I. It is not surprising, therefore, that, because of the many similar situations existing today, physicians and laymen alike are following with a great deal of interest reports of increases in the incidence of influenza in various parts of this country. They are all greatly concerned with the possibility that the reported outbreaks represent the preliminary phases of another pandemic.

Just what has been learned during and since the last pandemic that may be of help in preventing or controlling the ravages of another that may

be forthcoming? Briefly, much information was acquired during the 1918-1919 pandemic concerning the clinical, pathological and epidemiologic features of the disease, and a great amount of data was accumulated, which, though not conclusive, has shed considerable light on its etiology. The results of many studies made during the last few years have clarified the etiologic aspects still further. New tools have become available for the study of influenza and similar diseases, and the prospects for better prevention and control are considerably brighter today than they were a decade ago.

The first of the important recent contributions emanated from the Rockefeller Institute at Princeton and concerned swine influenza, the so-called "hog flu" of the veterinarians. Shope¹ showed quite conclusively that this disease is caused by a combination of a filterable virus and a visible bacterium, the latter having the biologic characteristics of *Haemophilus influenzae*, that is, the influenza bacillus of Pfeiffer, but differing from it in immunologic reactions and pathogenicity. In hogs, the filterable agent, that is, the swine influenza virus alone, produces only a relatively mild upper respiratory infection similar in most respects to uncomplicated human influenza; the visible organism, *H. influenzae suis*, by itself produces no demonstrable disease; but the combination of the virus and the bacillus produces a severe type of influenza, with a pneumonia similar to that observed in man during the great pandemic and with a correspondingly high fatality. The similarity of Shope's findings with what is known of the bacteriology and epidemiology of human pandemic influenza, added to the fact that the disease in swine was first recognized during the 1918-1919 epidemic and has recurred almost annually since then, lends support to his theory that the swine disease took its origin from man at that time. These findings also suggest that the severe and highly fatal form of human influenza may be of complex etiology and may involve both filterable viruses and visible agents. In man, the earlier experiences suggested that more than one visible agent may be involved and that, although the Pfeiffer bacillus may play a role in many cases

and in some epidemics, streptococci, staphylococci and pneumococci play the important secondary role in others.

With respect to the disease in man, a great advance was made when Smith, Andrewes and Laidlaw² succeeded in transmitting an infection to ferrets from typical cases of epidemic influenza. This was accomplished by intranasal instillation of filtrates from throat washings. The disease in the ferret differs from that of swine in that visible bacteria take no part in the infection. The hog virus, however, exhibits the same characteristics in the ferret. The filterable virus discovered by these workers, or viruses having the same pathogenicity and similar immunologic characteristics, have now been isolated from many epidemics in this country and in widely scattered places throughout the world. Numerous workers have already added considerably to our knowledge of the biology of the virus and the epidemiology of the infection with which it is associated. The virus can now be transmitted to mice, and it can be grown in tissue cultures and in the tissues of the developing chick embryo. The earlier studies with the influenza virus have suggested that separate serologic races of influenza virus may exist, and this has been borne out by more recent studies. These types of strains from human cases have been labeled "influenza A virus," "influenza B virus" and so forth, and the infections from which they are obtained are called influenza A, influenza B and so forth, respectively.

Animals infected experimentally with these viruses, and persons having clinical influenza during epidemics in which such viruses were recovered develop neutralizing and protective antibodies in their blood, or have an increase in titer of pre-existing antibodies. The experimental animals also develop resistance to reinfection. The duration of the immunity is relatively short, lasting from a few weeks to several months. The antiviral antibodies do not develop or increase in persons who have other respiratory infections, such as common colds, bronchitis and pneumonia.

A number of vaccination experiments have been

made in animals, and some of the results have been of sufficient interest to warrant a limited trial under carefully controlled conditions in human beings. Such investigations are now being conducted purely as experiments, but the results are being awaited with considerable interest. There are no satisfactory data concerning therapeutic experiments with immune serums produced by inoculation of animals with virus, and animal studies with such serums have not been too encouraging. Convalescent serums from human cases were used during the 1918-1919 epidemic in the treatment of a limited number of cases, with variable and mostly equivocal results. It is possible that the use of larger doses given earlier in the disease may prove more efficacious. The sulfonamides are entirely without effect on the virus. It is to be expected, however, that these drugs may favorably affect the secondary pulmonary infections when hemolytic streptococci, pneumococci or staphylococci are involved. There is also the possibility that the pathogenic bacteria cultured from cases of typical influenzal pneumonia are of only minor significance. This is suggested by the fact that in the ferret and in the mouse, the chief pathologic features may be reproduced by virus alone provided that the dose and virulence are adequate. In that event, chemotherapy would have little to offer. The effects on *H. influenzae* cannot be reliably predicted from available data, but will probably not be extraordinary.

Most physicians who had extensive experience with influenza during the 1918-1919 pandemic will probably say that the disease as seen then was radically different from that which has occurred in sporadic outbreaks during the last few years and which they are now seeing. Any deductions based on studies carried out recently must, therefore, be made with the reservation that the pandemic disease may be different in many respects from that occurring during smaller and milder epidemics that are included under the same clinical diagnosis of influenza.

REFERENCES

1. Shope, R. E. The influenzas of swine and man. *Medicine* 15:453-487, 1936.
2. Smith, W., Andrewes, C. H. and Laidlaw, P. P. A virus obtained from influenza patients. *Lancet* 2:66-68, 1933.

NATIONAL CANCER RESEARCH

THE grants-in-aid, totaling \$271,277.50, that the National Advisory Council has awarded to various institutions and persons constitute a significant contribution to the eradication of cancer; this council was set up by congressional action to advise the Surgeon General of the United States Public Health Service on all matters concerning the federal government's program for cancer research, and the funds, the distribution of which it supervises, are made available by congressional appropriation.

Grants amounting to \$129,085 for fundamental cancer research went to Harvard University; the University of Cincinnati; the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine; Duke University; the University of Chicago; Dr. B. R. Nebel, of the Experimental Station of New York; Institute of Cancer Research, Columbia University; Dr. John J. Bittner; Cornell University; the Barnard Free Skin and Cancer Hospital, St. Louis; the Michael Reese Hospital, Chicago; the Memorial Hospital, New York City; and Louisiana State University.

An additional \$92,570 was granted to the University of California, the University of Michigan and Washington University of St. Louis for experimental work on the cyclotron, the so-called "atom-smashing" machine, which produces radioactive particles that may prove to be valuable in treating cancer.

The National Research Council (for the American Registry of Pathology), the American College of Surgeons, the New York Hospital, the University of California, Meharry Medical College, of Nashville, Tennessee, and Dr. Harrison S. Martland received a total of \$49,652 for clinical cancer research.

The projected studies of radioactive substances to be produced by the cyclotron now being built by the Carnegie Institution, of Washington, D. C., represent further progress in cancer research; these experiments will be carried out through the collaboration of the Carnegie Institution and the National Cancer Institute. The latter has a staff

of thirty-eight scientists, fifty technicians carefully trained for specific investigations and a laboratory that is the largest of its kind in the world and is also complete with modern equipment.

The help that the Government is extending for research and treatment represents a praiseworthy contribution to the fight against cancer; the experiments stimulated by the grants-in-aid are a step in the direction of control and possibly eventual eradication of the disease.

OBITUARY

ERNEST AMORY CODMAN

1869-1940

Ernest Amory Codman, surgeon, good Bostonian and crusader, was born on December 30, 1869, and died on November 23, 1940, the victim of a painful, prolonged disease following many years of poor health, which he had borne with fortitude. A crusader is one who makes a difficult, dangerous campaign to save something precious, and without thought of gain for himself. Amory Codman's crusade was to ensure for all in need of surgery what he believed to be ideal treatment. Being an independent thinker of vigorous mind, whose emotions were easily stirred, he employed unconventional methods to accomplish his purpose. Perhaps he inherited this tendency from his militant grandfather, the Reverend John Codman. When this Congregational minister became aware that his flock was likely to be contaminated by the teachings of his brother preachers, he refused to allow any other than his own discourses in his church in Dorchester. A hostile element placed another minister in the pulpit and protected him there by a guard. But John Codman climbed up the steps as high as he could, addressed the congregation and walked out with a large majority of those in the church. The opposition soon gave in.

One would not have expected, perhaps, so striking a professional career from this particular Codman's beginnings. He attended a well-known boarding school, enjoyed the usual sports and made good friends among a variety of individuals. An excellent scholar, he ranked high in both school and college. Very early in his boyhood he took to hunting and fishing, sports which he pursued vigorously all his life, for which he always kept himself prepared, and which enabled him, in fact, to withdraw from and forget at intervals his excite-

ing professional life. Few have made better use of an avocation.

As a house pupil at the Massachusetts General Hospital in 1894-1895, he began to do original things. He kept the first ether charts with the idea of showing how harmless a good anesthesia could be. During his years in the Harvard Medical School, he had visited Vienna, where he learned of the importance of disease of the subdeltoid bursa and so secured his introduction to the shoulder joint. This became the love of his professional life, from which he was sometimes diverted but to which he always returned, the subject, finally, of his remarkable book.

When the roentgen ray was discovered in 1895, Codman was one of the first to explore its possibilities, and with his characteristic thoroughness he secured from physicists at Harvard and Technology the best advice and assistance available. It is even more characteristic that, having made complete roentgenologic studies of the important joints of the body, at considerable expense in time and money, all without being asked to do so by anyone, he should have presented his collection to the Warren Museum, where it was buried. Many years later, he came upon his atlas, dusty and apparently forgotten, an event which strengthened the conviction which earlier experiences had created, namely, that his labors were not likely to be recognized. As will presently appear, this attitude of mind, a sense of isolation, a feeling that others would not readily agree with his views, was a strong influence in his life, a peculiarity which in its most violent form caused him to introduce his astonishing cartoon dealing with hospital efficiency and in its mildest form led him to remark to one of his companions in partridge hunting that his dogs were always, like himself, a little queer. It is typical of his own appreciation of this quality that at one moment he should have consulted two alienist friends to inquire whether or not, in his battle for hospital efficiency, he seemed to them the victim of a dominant idea. But his self-consciousness about this matter was never morbid; he was not so introspective as all that. Indeed, he was often more than a little amused at himself.

The turning point in Codman's career came when he was about forty. He had gone up the ladder at the Massachusetts General Hospital and had become an assistant visiting surgeon, associated particularly with Dr. F. B. Harrington. He had begun to write timely, original papers, calling attention, first, to perforated duodenal ulcer and then to its chronic obstructing form. At about this period also, having put the subacromial bursa

on the map, his interest in bones and joints, the fruit of his work in the roentgenologic field, had caused him, with Dr. Henry M. Chase, to write an authoritative paper dealing with the hitherto unexplored subject of injuries to the bones of the wrist, under the title, "Fracture of the Carpal Scaphoid and Dislocation of the Semilunar Bone." He had also repaired with success the ruptured supraspinatus tendon. He was making a good living along rather conventional lines. At this time his conviction "that every hospital should follow *every* patient it treats long enough to determine whether or not the treatment has been successful, and then to inquire, If not, why not?" became the great interest of his life. The products and by-products of his efforts to convince others of the value of this scientific and entirely reasonable idea were truly extraordinary. They included a share in the creation of the American College of Surgeons, and especially its widely accepted standardization of hospitals. They included the Registry of Bone Sarcoma, the enthusiastic services of his hospital staff in the Halifax disaster, the remarkable meeting of the Suffolk District Medical Society and, finally, his book on the shoulder.

A visit to England in 1910 by the Society of Clinical Surgery seems to have been the occasion of the actual creation of the American College of Surgeons. Very likely the idea had been in the minds of many, but Codman tells how he and Dr. Edward Martin, of Philadelphia, discussed the end-result idea in a hansom cab, how hospitals might thereby be improved and how Martin held that "the tail is more important than the dog, but we shall have to have a dog to wag the tail." In 1912, when Martin was made president of the first formal Clinical Congress of Surgeons of North America (the initial step in the creation of the American College of Surgeons) he appointed Codman chairman of the Committee on Hospital Standardization, out of which came in the following year Codman's address to a great gathering on "The Product of a Hospital," in which he preached the revolutionary doctrine that institutions were responsible for the work of their staffs. He called on hospitals to study the product of each surgeon, analyze his results, compare them with those of others and actually enable the public to choose the appropriate surgeon for each disease.

Several years earlier, his desire to demonstrate how a hospital should be conducted had caused Codman to establish one of his own. He took the opportunity, offered by the publication of a series of annual reports, to discuss his success

or failure in each patient treated, explaining the bad results as due to errors of skill, judgment, care and so on. It must be supposed that this excessive frankness and his insistence on an assay by each hospital of the contributions of its staff helped to create, locally, in the profession an atmosphere rather hostile or at least resistant to his ideas. His resignation from the Massachusetts General Hospital in protest against promotion by seniority rather than merit did nothing to dispel this atmosphere, and when he asked to be reappointed and made surgeon-in-chief, on the ground that a study of his results over a ten-year period showed them to be better than those of others, he gave an impression of egotism which hurt his cause. Actually, this seeming boastfulness arose from his desire to be entirely consistent, or if you like, from his "New England" conscience. The record, he held, should govern. His own was open to inspection. Moreover, he believed that in a position of authority he could best carry on the end-result system.

The climax of his campaign was the meeting at the Boston Medical Library. As chairman of the surgical section of the Suffolk District Medical Society, he had arranged a comprehensive discussion of hospital efficiency. His difficulty in securing the speakers on, whom he had at first counted may have caused him to spring his surprise poster on the gathering. Perhaps he had had it in mind all along. In any event, he was a good enough showman to use the mayor of Boston as one of his speakers and to assemble a large and interested audience. Finally he presented his cartoon and explained its meaning. For the benefit of those not familiar with the episode, it should be explained that the cartoon, drawn by his friend, the artist, Philip L. Hale, centers about an ostrich. The bird represents the public. Its head is buried in the sand. It is laying golden eggs, which it kicks into the hands of the faculty of the Harvard Medical School and the staff of the Massachusetts General Hospital. Observations and queries are put into many mouths, and among the figures are several whose faces were true to life. Naturally there was a storm of protest, and Codman was, as he afterward said, in disgrace.

In the very revealing preface of his book on the shoulder,—he calls the book a balloon, of which the preface and epilogue are the basket,—he admits that he may have chosen his path badly, that he should have been either a leader or a satirist, not both. However, being at the same time a realist with a good backbone, he never regretted his escapade. Much of his purpose was accomplished. Special assignments of

surgical subjects had already been given to particular men at the Massachusetts General Hospital, and more specialization followed. An end-result system was created not only at that hospital but over the whole country, an epoch-making achievement: all patients must be followed, for years if necessary; everyone must explain his bad results. The matter was carried far, though not so far as Codman wished. There was no formal ranking of the hospital staff, an impossible feature, as he should have known. Yet one can discern in many institutions a process of sorting out without publicity or formality. There has been a tendency to push particular surgeons into certain fields and to bar them from others. For his too-impulsive action at the library meeting Codman had to pay in loss of dignity, prestige and professional income—a small price, he believed, considering the great result.

Then came the war, the generous volunteering of his hospital staff—with end-result cards to test its efficiency—in the Halifax explosion (1917) and in the following year his unselfish military experience. Serving in this country, he had little opportunity to practice surgery, but found ample scope for his do-or-die spirit in fighting the tragic epidemics which had broken out. As always, he brought along, and made excellent use of, his end-result cards and, of course, his shotgun and fishing tackle.

He returned to civil life in debt, to find his hospital closed and himself somewhat disillusioned about his capacity to alter human nature. He tells that, after having patched up so many splendid young men, he had lost much of his enthusiasm for keeping the aged and infirm alive, and was so filled with a desire to make a little money that he gave up his hospital, which had always been a drain on him, and charged his patients much more than before. Yet when he failed to save one of them—the wife of an intimate friend—he became inspired to make his great fight against bone sarcoma, for which he received no earthly reward.

The Registry of Bone Sarcoma, started in 1920, and his book on the shoulder, published in 1934, though seemingly unrelated to each other and to his end-result idea, were equally a part of it. To begin with, he labored, through the *Boston Medical and Surgical Journal*, as it was then called, to find out if any physicians in Massachusetts knew of any cases of bone sarcoma, particularly of any cured cases. When he discovered, or seemed to discover, that no one read his appeal in the *Journal* or would take the trouble, if they had really done so, to respond, he sent out return

postal cards by the cartoon. On the subject of the shoulder and especially the disabling rupture of the supraspinatus tendon, which he correctly ad- vertised to be an injury of great economic im- portance, he was even more disturbed that he could not secure recognition of his views or im- pose on the profession the need of prompt and successful diagnostic methods. Finally, he de- cided to write the best book on the subject, dedicat- ing it to the end result idea, through the American College of Surgeons. The main portion of the book, the balloon, is of course a masterful mono- graph on the shoulder, the preface and epilogue, the basket, as has already been told, are an arrest- ing and revealing story of his character and life.

To understand Codman one must read the beginning and end of his book. If one thinks of him as in any sense a disappointed man, one will soon find that such was by no means true. He agrees that he has had a good time in life. He calls himself quixotic, but he intensely dislikes being dubbed a "reformer." He certainly describes himself as, though he does not use the word, a "crusader." His creed was to think of the fu- ture, to work for coming generations. If he seemed at times to violate good taste or even professional ethics, he did so with the idea of attacking sham and smugness, the horrors of his life. He never said hard things of those who disagreed with him, only of those whose motives he felt to be un- worthy. And even then, he never attacked indi- viduals. If he liked, he could hold his tongue. He may, in the outbursts of his crusading spirit, have seemed to be a child, but if so, he was an *enfant terrible*, never cried and never asked for another chance.

As a surgeon, Codman did not hold himself to be especially skillful, though he knew himself to be ingenious and resourceful. He was cut out to be, what indeed he was, a "forlorn hope artist." He would see the possibility, which others might have overlooked, of succeeding in a des- perate operation. In overcoming obstacles to this end, he might irritate and annoy a hospital staff, but at last he would accomplish his purpose and secure the approbation of everyone concerned. It was impossible to resist his fundamental goodness and charm.

Amory Codman had many devoted friends in many walks of life. No one could associate with him intimately without coming under the spell of his enthusiasm, his squariness and the attractive whimsical streak which, in all but his most stren- uous moments, took the sharp edge off his intensity. In everyday life he was affectionate, thoughtful, fair, a good companion. His was a strong char- acter, remarkably free from pretense and affecta-

tion, uncompromising, of a sort much needed in this day. He should be counted one of New England's great figures, a man who has left a deep mark and has deserved well of posterity, for whom he labored.

J H

MEDICAL EPONYM

GORDON'S SIGN

Alfred Gordon (b 1869), of Philadelphia, in- structor in nervous and mental diseases, Jefferson Medical College, wrote of 'A New Reflex Para- doxic flexor reflex, Its Diagnostic Value' in *Ameri- can Medicine* (8:971, 1904)

It has been my good fortune to observe a new reflex which I found present in cases, the history of which points to organic diseases of the nervous system, and especially of its motor tracts, I found it always asso- ciated with exaggerated knee jerks, in some cases the Babinski reflex was present, in some not.

The reflex can be elicited in the following manner

The patient may either lie on his back or sit on a chair with the feet (not the legs) on a stool. The feet must be slightly rotated externally, in this po- sition complete relaxation of the muscles of the leg is obtained. The examiner must always place him- self to the outer side of the leg, the thenar and hypo- thenar muscles of his right hand must be placed on the inner surface of the tibia of the patient and the fingers press deeply upon the middle or the lower portion of the calf muscles. I say deeply because the pressure must be transmitted to the flexor mus- cles of the deep layer, sometimes pressure must be combined with lateral movements of the superficial muscles. If the reflex is present, extension of the great toe, or of all the toes, will be noticed. There is evidently no other muscle except the flexors that could be brought into display.

If excitation of the flexors produces an extension of the toes the reflex is certainly paradoxical.

R W B

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

PREGNANCY COMPLICATED BY MITRAL STENOSIS AND PNEUMONIA, AND RESULTING IN CESAREAN SECTION

Mrs F W, a twenty five year-old primipara, was first seen on September 3, 1913, when she was approximately seven weeks pregnant.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

The family history was unimportant. The patient stated that she had had rheumatic fever and St. Vitus's dance as a child. There was no history of any other illness. Catamenia began at twelve, were regular with a twenty-eight-day cycle and lasted five days. The last period began on July 12, making the expected date of confinement April 19, 1914.

Physical examination revealed a well-developed and well-nourished woman. The lungs were clear and resonant; there were no rales. The heart showed no enlargement. There was a question of presystolic thrill, and a murmur that was double at the apex. The apex beat was forcible. The pulse rate was 80. The abdomen was normal. Vaginal examination revealed the uterus anterior and slightly enlarged.

The pregnancy progressed satisfactorily until February 27, when the patient reported that a cold, which she had had for several days, had become much worse. She was unable to breathe and had a bad cough. She also stated that she was having abdominal cramps. She was thirty-two weeks pregnant at that time.

On February 28, the temperature was 100°F., the pulse 110 to 120, the respirations 35, and the systolic blood pressure 95. She was seen in consultation, and a diagnosis of pneumonia at the left base was made.

On March 1 the patient's condition was improved. The temperature was 99°F., the pulse 92, and the respirations 25.

The patient grew steadily better, and when seen on March 24, was completely recovered. The blood pressure at that time was 100 systolic, and the pulse was 80. The lungs were clear and resonant; there were no rales. Examination of the heart was as before. There was slight edema of the ankles. The uterus was enlarged to a size consistent with her dates. The vertex was presenting, but was not engaged. The question of cesarean section arose.

The patient was seen weekly from March 24 until she started in labor on April 19. After a consultation because the head was still not engaged, cesarean section was deemed advisable, and the patient was delivered of a female child weighing 7½ pounds, the only complicating factor being that she lost more than the normal amount of blood. The convalescence was uneventful.

Comment. This case of mitral stenosis resulted from an attack of rheumatic fever and St. Vitus's dance. Today such cases should be seen at the beginning of the pregnancy by competent cardiologists to determine whether the pregnancy should continue, and to supervise the patient properly from the standpoint of the heart condition through-

out the pregnancy. A cesarean section was done because the head was not engaged, and because most cases of mitral stenosis at that time were delivered in this way irrespective of the engagement or nonengagement of the presenting part.

The fact that this patient went through an attack of pneumonia when she was about seven months pregnant without signs of cardiac failure shows that the heart disease was well compensated. In spite of this it would have been much better if she had been confined to bed during the last six to eight weeks.

Subsequently, the patient again became pregnant and was aborted.

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning February 16:

MIDDLESEX EAST

Tuesday, February 18, at 4:15 p.m., at the Melrose Hospital, Melrose. Obstetric Infections: Diagnosis and treatment. Instructor: A. Gordon Gauld. Walter H. Flanders, *Chairman*.

MIDDLESEX SOUTH

Tuesday, February 18, at 4:00 p.m., at the Cambridge Hospital, Mt. Auburn Street, Cambridge. Acute Abdominal Pain: Its interpretation and management. Instructor: Richard B. Cattell. Dudley Merrill, *Chairman*.

NORFOLK

Thursday, February 20, at 8:30 p.m., at the Norwood Hospital, Norwood. Chemotherapy in the Treatment of Gonococcal Infection. Instructor: P. N. Papas. Hugo B. C. Riemer, *Chairman*.

NORFOLK SOUTH

Monday, February 17, at 8:30 p.m., at the Quincy City Hospital, Quincy. Nutritional Deficiencies and the Uses of Preparations of Vitamins. Instructor: Harold J. Jeghers. David L. Belding, *Chairman*.

SUFFOLK

Thursday, February 20, at 4:30 p.m., in John Ware Hall, Boston Medical Library. Diagnosis, Treatment and Prognosis of Central-Nervous-System Syphilis. Instructor: Francis M. Thurmon. Reginald Fitz, *Chairman*.

DEATHS

RICHARDSON — ANNA G. RICHARDSON, M.D., of Roslindale, died February 1. She was in her eighty-first year. Born in Lowell in 1861, she received her degree from the Woman's Medical College of Pennsylvania in 1891 and joined the staff of the Vincent Memorial Hospital a year later. She served successively as assistant surgeon, head surgeon and chief-of-staff until her retirement in

1929 For twenty years she was medical adviser to the New England Telephone and Telegraph Company

Dr Richardson was a member of the Massachusetts Medical Society and the American Medical Association, and was a fellow of the American College of Surgeons

Two nephews survive her

SANBORN—PERLEY L. SANBORN, M.D., of Marblehead, died February 3 He was in his ninety first year

Born in West Unity, New Hampshire, he attended Dartmouth College and received his degree from the Bellevue Hospital Medical College in 1877 He was a member of the staff of the Mary Alley Hospital in Marblehead and was a member of the Massachusetts Medical Society and the American Medical Association

A son and a granddaughter survive him

CORRESPONDENCE

THE NATIONAL LEPROSARIUM AT CARVILLE, LOUISIANA

To the Editor This note was written by a former associate of mine who is now teaching at Louisiana State University School of Medicine. I have greatly enjoyed reading it and think it will be of interest to the readers of the *Journal*

ELLIOTT C. CUTLER

Peter Bent Brigham Hospital,
Boston

Some time ago I visited the National Leprosarium at Carville, Louisiana, and found it very interesting. The Leprosarium is a Marine Hospital operated by the United States Public Health Service. Dr McCreery, the officer of the day, took me on his rounds and talked very interestingly about leprosy, the hospital and many sidelights.

The State of Louisiana originally established the Leprosarium in 1894, and it continued as a state institution until 1920, when the United States Public Health Service took it over. Prior to 1920, the United States Public Health Service appointed a board under the chairmanship of Dr George W. McCoy to select a site for a national leprosarium. Because of the loss of sensation and heat regulatory function of the skin, patients with leprosy fare better in a subtropical climate, and the board therefore considered sites in Florida, California and Texas, the states other than Louisiana from which most of the cases come. However, each time a location was decided on, the surgeon general was informed of local opposition to the establishment of a leper colony, and another site had to be chosen. The problem was finally solved by taking over the state leprosarium by congressional action.

The leprosarium is located on the east bank of the Mississippi River, about sixty five miles above New Orleans. The attending physicians, who are members of the United States Public Health Service, are assisted by several consultants in special fields who come up from New Orleans. Nurses are in charge of the nursing service, because it has been found to be impossible to hire lay people who will give satisfactory care to the lepers. The orderlies and helpers are patients whose leprosy is arrested or has regressed. They receive wages from the federal government for their services. Many of these orderlies are free to leave the hospital because of their improvement, but often they have no desire to go.

There are no wards, all the patients having private rooms. The original buildings consisted of a group of cottages, but a few years ago a large fireproof central building was constructed. It has a capacity of 65 patients and is called the Infirmary. All patients who re-

quire bed rest because of some systemic reaction or who have ulcerations on both feet are cared for here. A few rooms at the end of one corridor were equipped with heavy metal screen doors that could be locked. This provision has been made for mental patients with leprosy, but no patients of this type were in the hospital at the time of my visit.

All buildings are connected by wide 'pikes' covered overhead and screened on the sides. These passageways are very wide, and beds, wheel chairs and bicycles pass through them without difficulty. At present about 50 patients ride bicycles from one building to another. This form of transportation is a great boon to many patients with one bad (ulcerated) foot, who would otherwise be confined to the Infirmary.

This collection of buildings—the cottages and the Infirmary—is distinct from the other buildings that house the medical staff and their families, and the employees of the institution who do not take care of the patients. But there is very little contact between any part of the colony and the outside. River boats pump oil into tanks just inside the levee, and with this source of fuel, the institution maintains its own heating, refrigeration, power and lighting plants, and is quite independent.

Most of the patients at the colony are from southern climes. Halfbreed Mexicans seem to be more susceptible to the disease than members of the white race. Many other patients are of Spanish or French origin. Some are Chinese, Japanese, Jewish, Italian, and, of course, colored. It is impossible to discern nationality after the disease has advanced to certain stages. Dr McCreery told us about an exhibit of pictures of advanced cases of leprosy in patients of different nationalities. Although racial characteristics were easily noted in the early pictures, they were largely erased in the later ones.

The population of lepers in the entire colony during the last seven years has varied between 365 and 385 patients. About 60 cases are admitted annually, but these are not all new ones, since that figure includes some who have deserted instead of going through the routine of being released and readmitted and therefore may be counted as new patients. The 886 patients admitted up to 1938 came from Louisiana (212), Texas (148), California (168), Florida (65), New York (107) and other states (186). However, of the 349 inmates as of June 10, 1938, 140 were born outside of continental United States. Furthermore, many patients were born in states other than those from which they were admitted. Thus leprosy is a disease of aliens in California, but is a disease of native Americans in Louisiana. It has been estimated that the number of unsegregated cases, known and unknown to local health authorities, equals the number of segregated cases. Since Carville has the only leprosarium in the United States, it is readily seen that leprosy is not a numerically important disease in this country. However, an incidence of 50 cases per 1000 inhabitants has been reported in Africa.

Fewer deaths occur from leprosy than from rabies, the latter claiming about 50 lives annually in the United States. At Carville there are about 12 deaths annually, many of these being due to intercurrent infection. Approximately the same number become arrested cases. Some of the patients desert, but those who remain are cared for until something happens to change their status.

The morale of the leper is poor for the first week or ten days at the colony. There appears to be no euphoria as in tuberculosis. He soon makes friends with his kind, however, and many patients become quite cheerful. They have various indoor games to keep them occupied, and

the radio is a big factor in their entertainment. On the southern part of the grounds is a golf course for the use of those patients who are able to take advantage of it. They are dissuaded from being out in the heat of the day, since the bright, warm sun has a tendency to cause some of the lesions to flare up, and also because the patients tolerate heat poorly.

The privacy of the patients is constantly considered. Those seated in their rooms with their backs to the doors were not disturbed. We passed many rooms, presumably because Dr. McCreery knew that our entrance would be resented. Clinics are held weekly, but no patient is forced to attend them. They are asked once to go, and if they express a desire to be excused from attendance, they are not molested or asked again.

There are three varieties of leprosy, the nodular, the nerve and the mixed. The physical examination is important in the early diagnosis of the disease. Alteration in the degree of pigmentation, loss of hair from the eyebrows and, rarely, from the scalp, and atrophy of the skin are noted. Palpation will often reveal the rubbery induration so characteristic of the nodular form of the disease, and in the nerve type the peripheral nerves may be enlarged in a cylindrical, spindle-shaped or beaded fashion. Anesthesia and analgesia can be detected by the usual methods of testing cutaneous sensitivity.

Photographs are used quite extensively to record the findings. I saw some that showed very clearly the early loss of hair from the brows, and the parchment appearance of the atrophic skin. Other photographs recorded cases of ulnar, peroneal and facial nerve involvement. Another group of pictures represented x-ray studies of the bone lesions. The changes in the bones consist of simple absorption and are seen clearly in the small bones of the hands and feet. When pyogenic infection is superimposed on simple absorption, extensive bone destruction is seen. The portal of entry in these cases is usually an abrasion or laceration sustained inadvertently when the patients, who have lost their sense of pain, bump or scrape their hands or feet or burn themselves. To avoid burns from cigarettes, and to accommodate the flexion contracture of the phalanges of the hand, many lepers use very long cigarette holders.

In the laboratory the bacteriologist showed me some slides of the organism and called my attention to the characteristic palisade arrangement of the bacilli. They are found in large numbers in smears and biopsies in contrast to tubercle bacilli. Scrapings of the lesions yield a high percentage of positive smears, but sections are also taken. Nasal secretions are said to be the commonest source of material to be examined to demonstrate an arrested case, but the positive nasal scrapings are so constantly associated with demonstrable nasal lesions that any suggestion of the latter makes examination of the nasal secretions unnecessary.

The first patient we saw had been an advanced case when he was admitted to the colony many years before. Now all he has is some falling in of the nasal bones, slight atrophy of the skin, and evidences of recent operations on the face. I was shown a picture of this patient taken when he had arrived at Carville several years previously, and it was obvious that the lesions had improved markedly. His was the nodular type that causes the leonine appearance because the rubbery induration does not cross the natural skin folds or lines of cleavage. This patient had taken up hunting, and although he made great claims for his prowess in that sport, I was told that his sight was so poor, because of an iridocyclitis and associated corneal opacities due to ulceration, that he often made a mistake in identifying his game and its location. Some

time ago he aimed his gun at what he thought was fair game but the charge went in the direction of a house outside the hospital grounds. The neighbor retaliated by sending a charge of buckshot at the patient, and some of it lodged in the skin of his face. The last of these had been removed just recently.

The youngest patient on record at Carville was three years old, but the disease has been seen elsewhere in a patient nineteen months old. The disease is very rare before the age of ten, yet children are more susceptible than adults. This seems to be a paradox, but the explanation lies in the long period of incubation. One patient was only nine years old and had been admitted to the leprosarium five years before, soon after the diagnosis had been made. His mother, who was also a leper, was admitted at the same time, but she died several months ago. Recently an aunt of the boy was admitted with very early lesions. This is an example of the familial predisposition to the disease that is seen in many cases. Although the boy is only nine years old at present, he has rather extensive lesions on his face and much swelling of his hands and fingers. This swelling, which may also involve the feet, seems to be a common accompaniment of the lesions and is without a general cause, such as renal damage or cardiac decompensation. I noticed that many of the patients had made openings in their shoes to make room for swollen feet.

A group of four patients in one room were listening to a radio program. I thought that one of them was quite young, but I was told that when the lesions become so advanced it is impossible to estimate accurately the age of a patient. The one in question was about thirty years old.

One patient had rather advanced leprosy, and as often happens in such cases, was beginning to show signs of kidney damage. He had edema of the abdominal wall and scrotum and considerable ascites. He had been given twelve doses of Salyrgan without any improvement. Although these patients show evidence of renal failure, no lesion characteristic of leprosy occurs in the kidney. However, nodular infiltration is found in the liver, making it appear to have been sprinkled with white pepper. This patient wore a tracheotomy tube because of laryngeal involvement. I learned that leprosy attacks the upper air passages, particularly the nose and larynx, but does not involve the lower respiratory tract. In the larynx, nodules form on the vocal cords, and scar-tissue contraction follows the ulceration that occurs. The resulting stenosis may cause slight changes in the voice early in the course of the laryngeal lesion, but later, obstruction occurs and acute changes in the obstructed area often necessitate emergency tracheotomy. On the other hand, the ulceration in the larynx may, by its destruction of tissue, bring about improvement by decreasing the degree of stenosis. This improvement, however, is temporary. The incidence of laryngeal involvement is much greater in leprosy than it is in tuberculosis. Three patients with tracheotomy tubes were seen on ward rounds. At one time fourteen patients were thus equipped, and the laryngeal involvement seemed to be almost epidemic.

Another patient had a septicemia due to the leprosy bacillus, and during this blood-stream invasion, fresh crops of macules came out at irregular intervals and were accompanied by exacerbation of constitutional symptoms. Blood cultures had not been done because of the persistent failure of attempts to cultivate the organism. This patient had a lesion on the radial side of the extensor surface of the left wrist. It was light red, brightest at the edge, and smooth and shining, showing a definite outline. Later the macules and the neighboring normal skin be-

came anesthetic. The center of the macule may become white and atrophic. The color of the lesions varies according to the natural pigmentation of the skin. In deeply pigmented skins the macules may be violaceous or copper colored. The reaction to the blood Wassermann test is positive in many cases of leprosy, and this finding, as associated with skin lesions, has often prompted the diagnosis of syphilis. It is not surprising, therefore, that many cases of leprosy have been found in venereal clinics.

In guarding against contagion, simple cleanliness is all that is ordinarily practiced by the physicians, who wear gowns like those used in ordinary contagious wards. After examining patients and palpating some of the lesions with bare hands, thorough washing of the hands is considered sufficient precaution against the disease. I was told that during the last fifty years at this institution no case of leprosy has been considered attributable to contact between patient and personnel.

The organisms are found in biopsies of lesions of the anesthetic type if taken during the inflammatory stage. It is said, however, that this type of lesion is not responsible for spread of the disease because the organisms are not discharged from them.

Even when the disease is active, patients may be released for sufficient reason but must travel in a private conveyance. Often a patient whose wife may be ill or dying does not wait for an official release. He simply deserts, hops a freight train, and when the urgent matter is taken care of, he reports back to the institution. These patients encounter no difficulty in being readmitted.

Patients may be paroled when the lesions are considered inactive. Two factors are considered in arriving at this conclusion. The lesions must be inactive from every clinical standpoint, and examination of scrapings from the lesions must show no organisms on twelve different occasions. Such patients return from time to time for re-examination, and if the lesions become active again, they must return to the colony.

The only treatment other than excellent general hygiene consists of chaulmoogra oil. A supply of it is kept on the dining tables and is used at each meal. An ethyl ester of chaulmoogra oil has been used intramuscularly, and sodium chaulmoograte has also been given a trial. There is some doubt about the efficacy of these preparations, and it was my impression that little progress has been made in the treatment of leprosy.

I heard about John Early, the famous leper. John Early's home was originally in one of the Carolinas. He was educated in law, in addition to a sound general education, and developed a good command of the English language. He turned from law to religion and became a preacher of a radical type. At some time during his early years he was on military duty in the Philippines, and it is said that this is where he contracted his leprosy.

He was well known throughout the United States Public Health Service because of his many escapes from the colony. His most famous escapades consisted of trips to Washington, where he attempted to impress government officials with the need for changes at the leprosarium, which they had ignored when he attempted to handle matters by correspondence. It is said that he was paid great attention at one time when he registered at a prominent hotel in Washington and later announced that he was John Early, the famous leper.

Following one of his later escapes he made his way to California and acquired a house and a car, and recorded his ownership of them in such a manner that considerable provision had to be made for their disposal before he could be returned to the colony. I believe that a patient

cannot be sent to Carville unless some satisfactory arrangements have been made for the disposal or care of his property.

Back in the hospital again he wrote an autobiography. Whatever the contents of the book, they were censored so much that not more than enough material for a single chapter remained. Undismayed, he tried to have it published under the title of *The Fourteenth Chapter in the Life of John Early, the Famous Leper*. I do not know whether it ever reached book form.

His last escape was made shortly before his death. This time he went back to his native Carolina hills. A doctor and an attendant from Carville were sent after him and, with the aid of several local peace officers, finally found John Early. However, no one would touch him except the two from Louisiana and it remained for them to drag him down the mountainside and back to the leprosarium. On his return, his sight and hearing failed rapidly and he died soon thereafter.

In the pathology laboratory there is a large glass specimen jar on which is a label headed "Treasury Department". In this container rest some of the remains of John Early. The many stories about this patient will probably keep his memory alive for a longer period of time than will the specimens in the jar bearing his name.

This long story has omitted many little incidents that occurred during my short visit, but to one who had seen only three cases of leprosy before, this experience was extremely interesting and instructive.

JOHN L. KEELEY, M.D.

NOTICES

MASSACHUSETTS MEMORIAL HOSPITALS

There will be a staff meeting of the Massachusetts Memorial Hospitals in the Evans Memorial Auditorium on Friday, February 28, at 8 15 p.m. Dr. C. W. Sewall will preside.

PROGRAM

- Hypertension and/or the Albuminuria of Pregnancy
Dr. Foster Kellogg Discussion by Dr. Duncan Reid
- Postnatal Care A year's study in the Follow Up Clinic
Drs. C. W. Sewall and O. C. Mullaney Discussion by Dr. J. T. Williams

NEW ENGLAND PATHOLOGICAL SOCIETY

The next meeting of the New England Pathological Society will be held on Thursday, February 20, at 8 p.m., at the Mallory Institute of Pathology, Boston City Hospital.

PROGRAM

- Eosinophilic Granuloma of Bone Dr. L. S. Jolliffe
- Intranuclear Inclusions in Infants Dr. T. D. Kinney
- Inter-capillary Glomerulosclerosis Drs. H. Jeghers and O. J. Wollenman, Jr.
- The Pathology of Athetosis Is it malformation or birth injury? Dr. L. Alexander

MASSACHUSETTS DEPARTMENT OF CIVIL SERVICE AND REGISTRATION

School Physician, Department of Health, Worcester, \$1200 a Year

Director of State Civil Service, Ulysses J. Lupien has recently announced that a competitive examination is to

be held on April 26 in order to find eligibles for appointment to the position of school physician, Department of Health, Worcester.

The entrance requirements are as follows: applicants who have not reached their thirtieth birthday on the day of examination will not be eligible to apply; applicants must be registered physicians under the State Board of Registration in Medicine. The subjects and weights of the examination are as follows: training and experience, 2; practical questions, 3; total, 5. Applicants must obtain a grade of 70 per cent in each subject in order to become eligible. The last date for filing applications is Saturday, April 12, at 12 o'clock noon.

NEW ENGLAND BRANCH OF THE AMERICAN UROLOGICAL ASSOCIATION

The ninety-first meeting of the New England Branch of the American Urological Association will be held at the Harvard Club of Boston, on Thursday, February 27, at 8:15 p.m.

PROGRAM

Recent Advancements with Chemotherapy in Infections of the Urinary Tract. Dr. E. N. Cook, of Rochester, Minnesota.

Chemotherapy in Gonococcal Infections. Dr. O. F. Cox.

Formal discussion to be opened by Drs. C. S. Keefer and Champ Lyons.

NORFOLK DISTRICT MEDICAL SOCIETY

A regular meeting of the Norfolk District Medical Society will be held at the Hotel Puritan, Boston, on Tuesday, February 25, at 8 p.m. Tel. KEN 1480.

PROGRAM

Business.

Medicolegal Meeting. Mr. Leland Powers and Dr. W. J. Brickley.

Discussion.

Collation.

NEW ENGLAND SOCIETY OF PHYSICAL MEDICINE

There will be a meeting of the New England Society of Physical Medicine at the Hotel Kenmore, Boston, on Wednesday, February 19, at 8:00 p.m. A business meeting at 6:00 p.m. will be followed by an informal dinner in the Empire Room at 6:30 p.m.

PROGRAM

Medical Preparedness. Dr. Walter G. Phippen, president, Massachusetts Medical Society.

All members of the medical profession are cordially invited to attend.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, FEBRUARY 16

SUNDAY, FEBRUARY 16

†4 p.m. The Use and Abuse of Vitamins. Dr. Maurice B. Strauss. Free public lecture. Harvard Medical School, Building D.

†4 p.m. Our Food and Our Health. Mrs. Muriel L. Reese. Cambridge Hospital, Margaret Jewett Hall.

MONDAY, FEBRUARY 17

12:15-1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.

TUESDAY, FEBRUARY 18

*9-10 a.m. The Psychosomatic Problem: Its significance for the physician. Dr. Kurt Goldstein. Joseph H. Pratt Diagnostic Hospital.

*12 m. Chronic Arthritis. Dr. Frank R. Ober. South End Club. Headquarters of the Boston Tuberculosis Association. Columbus Avenue, Boston.

12:15-1:15 p.m. Clinicoroentgenological conference. Peter Bentham Hospital amphitheater.

WEDNESDAY, FEBRUARY 19

*9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. H. Pratt Diagnostic Hospital.

*12 m. Clinicopathological conference. Children's Hospital.

*2-4 p.m. Anemia. Drs. W. P. Murphy and Robert Zollinger. Bent Brigham Hospital.

8 p.m. Boston Society of Biologists. Massachusetts Institute of Technology.

*8 p.m. Medical Preparedness. Dr. Walter G. Phippen. New England Society of Physical Medicine. Hotel Kenmore, Boston.

THURSDAY, FEBRUARY 20

*8:30 a.m. Combined clinic of the medical, surgical, orthopedic, pediatric services of the Children's Hospital and the Peter Brigham Hospital, at the Children's Hospital.

*9-10 a.m. The Perennial Tonsil Problem. Dr. W. A. MacColl. J. H. Pratt Diagnostic Hospital.

8 p.m. New England Pathological Society. Boston City Hospital Mallory Institute of Pathology.

FRIDAY, FEBRUARY 21

*9-10 a.m. Some Characteristics of Experimental Deficiency Diseases. Dr. O. A. Bessey. Joseph H. Pratt Diagnostic Hospital.

*Open to the medical profession.

†Open to the public.

FEBRUARY 20-22 — American Orthopsychiatric Association, Inc. Page issue of December 12.

FEBRUARY 24 — New England Heart Association. Page 262, issue of February 6.

FEBRUARY 27 — New England Branch of the American Urological Association. Notice above.

FEBRUARY 28 — Massachusetts Memorial Hospitals. Page 303.

MARCH 8 — American Board of Ophthalmology. Page 201, issue August 1.

MARCH 12-14 — New England Hospital Assembly. Hotel Statler, Boston.

MARCH 13 — Pentucket Association of Physicians. Page 263, issue August 15.

MARCH 21-22 — New York University College of Medicine, Alumni Page 135, issue of January 16.

APRIL 21-25 — American College of Physicians. Page 1065, issue June 20.

APRIL 28-30 — American Academy of Physical Medicine. Scientific session. Hotel Pennsylvania, New York City.

MAY 21, 22 — Massachusetts Medical Society, Boston.

MAY 28-JUNE 2 — American Board of Obstetrics and Gynecology. Page 262, issue of February 6.

JUNE 2-6 — American Medical Association. Cleveland, Ohio.

OCTOBER 14-17 — American Public Health Association. Page 135, issue of January 16.

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

MARCH 5 — X-ray in Heart Disease. Dr. Merrill C. Sosman. Essex Streetorium, Middleton.

APRIL 2 — Pediatric Problems in General Practice. Dr. Joseph Garlin. Addison Gilbert Hospital, Gloucester.

MAY 14 — Relation of the Doctor to the Law. Mr. Leland Powers. N. Ocean House, Swampscott.

FRANKLIN

MARCH 11.

MAY 13.

Meetings will be held at 11 a.m. at the Franklin County Hospital, Greenfield.

NORFOLK

FEBRUARY 25 — Notice above.

MARCH 25 — To be announced.

MAY 8 — Censors' meeting. Hotel Puritan.

SUFFOLK

APRIL 30 — Page 604, issue of October 10.

MAY 1 — Censors' meeting. Page 261, issue of February 6.

WORCESTER

MARCH 12 — Memorial Hospital, Worcester.

APRIL 9 — Hahnemann Hospital, Worcester.

Supper at 6:30 p.m. followed by a business meeting and scientific program.

BOOK REVIEWS

New Facts on Mental Disorders Study of 89,190 cases By Neil A Dayton, MD, MC 8°, cloth, 486 pp., with 110 graphs and 84 tables Springfield, Illinois Charles C Thomas, 1940 \$4.50

This book is a statistical study of the patients admitted to Massachusetts state mental hospitals during the years 1917 to 1933 inclusive. The collection of data on which the study is based was initiated by the late Dr. George M. Kline, commissioner of the Massachusetts Department of Mental Diseases, who secured a grant from the state legislature in 1926 for the purpose. The study extended over the ensuing period of eight years, with the aid of grants from the Laura E. Spellman Rockefeller Memorial Fund. The laborious task of organizing and analyzing the mass of data thus collected has been carried out since 1935 by Dr. Dayton with the help of an assistant and clerical workers and with the financial aid of the Rockefeller Foundation.

For the purposes of the study, the 89,190 cases that came under consideration were divided into four groups: 56,579 first admissions 'with mental disorder', 9,299 first admissions without mental disorder, 20,635 readmissions with mental disorder, and 2,677 readmissions without mental disorder. After discussing the social and economic developments of the eventful years 1917 to 1933 (World War I, Prohibition, Depression) and considering possible influences on the number of persons admitted to mental hospitals in Massachusetts during those years, the author proceeds to the statistical analysis of the four groups of cases, with reference to age, nativity, alcoholism, marital status and clinical diagnosis. In the last chapter the author answers the question, 'Are mental disorders on the increase?' as follows: 'The larger part of the supposed increase in mental disorders has come about mechanically, through the extremely long hospital stay of patients with this type of illness. Only one sixth of the total increase could be attributed to rising numbers of admissions.'

It is impossible in a brief review to deal adequately with the numerous conclusions that emerge from the welter of data. A few of the highlights may be mentioned. Mental disorder is a disease of old age, and 'The highest proportion of newly developing cases of mental disorder (first admissions) do not occur in the younger or middle ages but in persons who have proved their adequacy by several decades of successful living. The foreign born present the highest admission rates, and the native born of native parentage the lowest. Chronic alcoholism is a prominent etiologic factor in one fifth of all admissions to mental hospitals in Massachusetts, and the evidence suggests that Prohibition may have been more successful especially with women, in controlling alcoholism (even in the depression years) than has generally been realized. This suggestion may, however, be a reflection of decreased facilities for caring for alcoholic patients in the mental hospital system. The author concludes that the married have the least chance of developing mental disorders of any of the marital groups. The widowed, the single and the divorced, in order, show a higher incidence of mental disorders. An interesting detail is an apparent relation between religious denomination and the incidence of mental disorder. Protestants present the highest admission rate and are followed in order by the Catholics, other denominations and the Hebrews. The leading mental disorders in the Protestants are psychoses with Huntington's chorea and the senile psychoses in the Catholics the alcoholic psychoses and psychoses with mental deficiency,

and in the Hebrews the psychoneuroses and undiagnosed psychoses.

There is no doubt that this book is an extremely important and authoritative contribution to general psychiatric literature, it is certainly destined to become a standard reference that will be widely consulted and quoted for many years. Typographic features that deserve special mention are the many excellent graphs and the concise summaries at the beginning of each chapter.

Edinburgh Post Graduate Lectures in Medicine Vol 1 8°, cloth, 513 pp., with 110 figures, 32 tables and 11 charts Edinburgh Oliver and Boyd, 1940 10s 6d (\$2.10)

This volume of lectures delivered at the Royal Infirmary, Edinburgh, Scotland, is part of the postgraduate program organized over a generation ago in this great medical center. It is of timely interest to physicians in New England, where a similar program is now being intensively developed. With us, as in Great Britain, it has become recognized that provision for postgraduate study is necessary if our profession is to maintain that high standard of efficiency upon which we pride ourselves, and that the physician must remain a student throughout his active professional life.

The thirty-three lectures comprising this book come from men who are authorities in their respective subjects, among them Edwin Bromwell, Sir David Wilkie and W. T. Ritchie. The range of subjects is wide and interesting, and particular emphasis is laid on their application to general practice. Several of the topics may be cited: 'Upon the Pupil Reaction,' 'Some Modern Problems in Neurology,' 'Practice, Rational Use of Treatment of Nephritis,' 'The Acute Abdomen in Childhood,' 'The Lungs and Pleura—Certain Anatomical Facts in Relation to Disease,' 'Recent Development in the Surgery of Obstructive Jaundice, with Special Reference to the Risk of Hemorrhage.'

In form and in content this book is worthy of the high Edinburgh tradition. It is labeled Volume One. May it be followed by many more!

Clinical Heart Disease By Samuel A. Levine MD Second edition, revised and reset. 8°, cloth, 495 pp., with 109 illustrations Philadelphia and London W. B. Saunders Company, 1940 \$6.00

The second edition of this already well known book follows in general the form and content of its predecessor. The presentation of the subject lends itself to easy reading and properly reflects the experience of the author as an investigator, a teacher and a specialist in the field of cardiovascular disease. A number of welcome additions and amplifications of practical importance appear in the new edition.

The book is designed and written primarily for the practicing physician. However, the special student of cardiovascular disease will encounter with interest many original ideas that have appeared in special publications in the past by the author and his associates here to be re-emphasized, modified or abandoned in the light of further experience. For example the operation of valvulotomy for mitral stenosis, proposed in 1923, has rightly been discarded as impracticable, the use of adrenalin administered subcutaneously as a test for angina pectoris in questionable cases, as the author points out, is fraught with danger and the routine administration of quinidine sulfate following acute coronary thrombosis as a prophylactic

measure against fatal ventricular fibrillation has been modified in favor of its occasional use in special cases. With these recommendations there is general agreement. It is with mild disappointment, however, that one finds again in the new edition the suggestion that rheumatic infection may be the result of "some inherent hereditary defect in metabolism associated with growth or with the glands of internal secretion that renders some individuals particularly susceptible to some noxious agent that is fairly prevalent." To the reviewer, such speculation seems unduly fanciful. The discussion of angina pectoris and of coronary thrombosis is especially well arranged and should be most helpful in the management of patients with these disorders of the heart. Certain outstanding clinical problems are well emphasized in special chapters; for example, "Acute Cardiovascular Emergencies" and "The Clinical Significance of the Systolic Murmur." Furthermore, the newly added chapter, "Medicolegal Aspects of Heart Disease," will be especially welcome to the physician who, often against his desire, either on the witness stand or elsewhere finds himself faced with difficult decisions in connection with this aspect of heart disease.

The field of clinical electrocardiography is covered adequately, with well-chosen illustrations, in the final chapter of the book. Perhaps the rather gloomy outlook with which the author views the finding of evidence of intraventricular block, especially of the left-branch type, might have been tempered by the brief mention of so-called "functional-bundle-branch block" with a short PR interval—rare, to be sure, but important to be recognized.

The medical profession is fortunate in having available a new and up-to-date edition of this book, which is especially adapted to the needs of the practicing physician. Its continued usefulness is assured.

The Control of Tuberculosis in the United States. By Philip P. Jacobs, Ph.D. Revised edition. 8°, cloth, 387 pp. New York: National Tuberculosis Association, 1940. \$2.00.

This book should prove useful to those interested in tuberculosis as well as to all who seek information concerning methods of preventive medicine.

The author was for many years associated with the educational and publicity program of the National Tuberculosis Association, and wrote extensively on health education. It is therefore fortunate that this work was completed before his untimely death.

The book deals with the history of the antituberculosis movement, and with methods for the control of tuberculosis in the United States. The subject matter is exhaustively treated, dealing with such varied topics as fund raising and case findings. There are excellent chapters entitled "Adult Health Education," "Social Service and Rehabilitation," "The Negro Problem," "Treatment and Hospitalization" and "Relations to the Medical Profession." The fundamental principles of the tuberculosis programs also receive attention.

The book reflects Mr. Jacobs's attitude as a crusader and enthusiastic teacher who understood in a practical way the psychology of health education under a democratic system. The style, although simple, is forceful, and the subject matter concisely but thoroughly treated. This book is the fruition of an active mind and scientific training in a chosen field.

All interested in disease-control programs will find valuable information in this work.

Gynecological and Obstetrical Pathology, with Clinical and Endocrine Relations. By Emil Novak, M.D., D.Sc. (Hon. Dublin). 8°, cloth, 496 pp., with 427 illustrations. Philadelphia: W. B. Saunders Company, 1940. \$7.50.

This is an excellent book, presenting as it does the lesions of the female genital tract from the point of view of a gynecologist. It is easy to read and covers the subject very adequately. In addition there are excellent chapters on the normal physiology of the ovaries and pituitary gland, with their endocrine relations, and on the normal histologic changes in the endometrium in the course of the menstrual cycle. The pathologic states of each organ are grouped together in sections, and preceding each is a short description of the normal.

A major fault of the book is in the illustrations. The title page states proudly that there are four hundred and twenty-seven of them, but of these probably no more than a quarter are above criticism. This is because, in the first place, they were originally low-power photomicrographs, and, in the second, they seem to have been reduced in size in the printing. The result is a picture that lacks sufficient detail to mean much to anybody but an expert. It is also a very personal book, but what axe grinding there is does not intrude too much.

All in all, the average obstetrician and gynecologist should certainly have this book available for reference. Its use is greatly facilitated by a well-arranged twenty-three-page index.

Electrocardiography. By Chauncey C. Maher, M.D. and Paul H. Wosika, M.D. Third edition. 4°, cloth, 334 pp., with 42 diagrams and 5 radiograms. Baltimore: Williams and Wilkins Company, 1940. \$4.00.

Electrocardiography has developed into another useful and important procedure for the clinician. Like the Wassermann test and x-ray examination, the electrocardiogram offers important data to be included or corroborated with the other clinical observations to arrive at an accurate diagnosis. The physician who observes the patient is the final judge in each case, even though the laboratory evidence may voice a dissenting opinion.

With this view in mind, the book is illuminating and practical. It gives the physician-student of medicine an opportunity to acquire a fundamental knowledge of electrocardiography. The one hundred electrocardiograms that are reproduced and discussed cover a goodly number of the common varieties of cardiac disease, including the arrhythmias, conduction deformities, axis deviations and changes that result from coronary occlusion. There are also a number of diagrams illustrating the intrinsic mechanism of the heart beat.

The arrangement of the book is in a convenient form, showing the electrocardiogram on one side of the page and its interpretation on the opposite one, preceded by a clinical diagnosis. The interpretations are clear, precise and conservative. This edition includes the fourth lead, the most notable recent addition to electrocardiography. The book is highly recommended.

Correction

The reviewer of *The Diagnosis and Treatment of Diseases of the Peripheral Arteries*, by Saul S. Samuels, wishes to correct an erroneous impression that may have been obtained from the review published in the issue of December 26, 1940. The opening sentence of the third paragraph of the review should have read, "Some of the subject matter in the book appears to be misleading to the reviewer," inasmuch as in the reviewer's experience Uroselectan is an irritating solution for arteriography.

The New England Journal of Medicine

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VOLUME 224

FEBRUARY 20, 1941

NUMBER 8

FAVORABLE TYPES OF BRAIN TUMOR AND THE RESULTS OF THEIR OPERATIVE REMOVAL¹

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BOSTON

ALTHOUGH it is within comparatively recent years that the natural history and useful survival periods of patients harboring various types of brain tumor have been the subject of investigation, the published reports have been surprisingly few. The vast majority of these have come either from Harvey Cushing himself or from his pupils. In van Wagenen's¹ report in 1934 of 149 cases from Cushing's clinic seen eight years previously, the survival rate for all types of tumor (benign and malignant) was 35 per cent. From a review of this material it appears that 75 patients—roughly half—had what might be called "favorable tumors." Of these, 45, or 60 per cent, as nearly as can be made out, were leading useful lives.

In 1936 Cairns² made a somewhat similar though more exhaustive study of 157 cases seen in Cushing's clinic nine years previously. There were 22 postoperative deaths, leaving 135 patients on whom the study was chiefly based. Sixty-three of these patients were living at the nine-year interval, giving a survival rate for the entire series of 40 per cent. It is difficult to estimate the number of patients out of the original 157 who had favorable tumors, but from the tabulation it is safe to say that 78, or about half, harbored growths of this character. Cairns estimates that 37 patients were leading useful lives at the time of his study, and since these were all among the favorable tumors, 47 per cent, or nearly half, apparently came into this category.

The conclusions that I have drawn from the data given in Cairns's and van Wagenen's papers are at best only rough estimates, but I think that one is justified in saying that at least 50 to 60 per cent of the patients having favorable tumors in these reported series were living useful lives

eight and nine years after operation. That this percentage was not considerably higher I take to be owing to two operative features that show the advances in neurosurgery. First, in the years that both these series of cases were operated on, trans sphenoidal operation for pituitary tumors was being used. The results from this type of operation, although at times brilliant, were on the whole far less complete or permanent than the intracranial operation later used by Dr. Cushing and now almost universally employed by all neurosurgeons. Secondly, the operation for acoustic neuromas was, in those years, the so called "intracapsular extirpation." By this means a shell of tumor with a greater or lesser amount of tumor cells was left behind, and recurrence was inevitable. At the present time these tumors, almost without exception, should be totally removed, with a mortality no greater than that of the incomplete operation, that is, slightly less than 10 per cent.

A much more comprehensive report of survival periods was published by Eisenhardt³ in 1935 from the records of Cushing's complete series. Of about 2000 patients it appears that 499, or almost exactly 25 per cent, had survived from five to twenty-eight years following operation, but if one deducts the immediate operative deaths (approximately 400), the figure for the remainder is 31 per cent. This survey, like those of van Wagenen and Cairns, included all tumors, benign and malignant, but did not deal with the question of useful survival; therefore this feature and its relation to the favorable types of tumor cannot be estimated from the data available.

It is evident from the contents of the articles just quoted that the vast majority of patients surviving five or more years were those who harbored favorable tumors. It has been my purpose, therefore, in the present discussion, to look up the number and percentage of these favorable tumors in my own series, to tell what has been done for them

¹Presented at the annual meeting of the New England Surgical Society, Poland Spring, Maine, September 27, 1940.
From the neurological departments of the Lahey Clinic, New England Deaconess Hospital and New England Baptist Hospital.
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and to gain as clear an idea as possible of their survival and state of usefulness, since after all it is only useful survival that should be the aim of any form of therapy. Furthermore, it is only by going over one's material, following the patients for many years, and putting the facts on paper, that the profession and the public can be made to realize that there is an entirely hopeful side to the surgery of brain tumors and that a large percentage of patients can be and are completely cured.

The material on which the present study is based consists in the hospital records and follow-up reports (by personal interview or letter) of 400 consecutive patients with brain tumors that were verified pathologically from November, 1932, to June, 1939. Of this total number I have classed 224, or 56 per cent, as favorable tumors. By the term "favorable" as here used is meant tumors that were capable of complete and permanent removal, resulting in cure of the patients. This does

ever, is that in going over the records of all these 400 patients carefully it is apparent that well over 50 per cent harbored tumors that were, or should have been, totally extirpated. Among the 224 favorable tumors there were 27 operative deaths, a mortality of 12 per cent. This leaves 197 survivors, but of these, 10 have died subsequently,

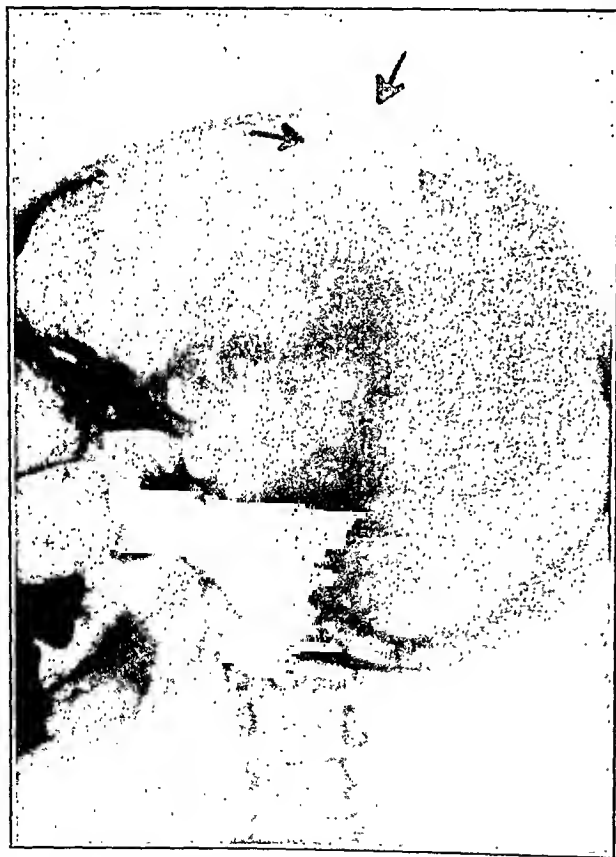


FIGURE 1. *Localized Thinning and Increased Vascularity at the Site of a Meningioma near the Vertex.*

not, of course, imply that all the 224 patients had their tumors removed and were cured. In a few cases the technical or other difficulties apparently prevented complete removal, and there was obviously an inescapable operative mortality, which will be given. What I wish to make clear, how-



FIGURE 2. *Calcification in a Parieto-occipital Meningioma.*

leaving a final figure of 187 patients who are living and whose tumors I believe to have been wholly eradicated.

Coming now to the pathological types of favorable tumors, one finds that the 224 may be classed as follows: meningiomas, 80; acoustic neuromas, 33; pituitary adenomas, 30; gliomas (mostly cystic), 29; miscellaneous, 52. A note of explanation is due the miscellaneous group. Rather than give a long list of comparatively infrequent tumors, it has seemed best for the present purpose to put together in this category the remaining favorable growths, including certain angiomas, hemangiomatous cysts, colloid cysts of the third ventricle, certain craniopharyngiomas and pinealomas, cholesteatomas and unclassified tumors.

A brief word may now be said about the diagnosis of and the operations on these favorable tumors. The meningiomas, as might be expected, head the list. They are the solid encapsulated growths, usually occurring over the cerebral con-

vexities and often arising from or invading one of the major venous sinuses. Sometimes, however, they are found nestling between the optic nerves, or growing to huge size under both frontal lobes. Frequently they give recognizable changes in the skull by x-ray—increased localized vascularity, bony thickening or spiculation, enostoses, calcification or what appears to be a large osteoma overlying an intracranial tumor (Figs. 1 and 2). Although all the tissues surrounding meningiomas

then be removed piecemeal by the electrosurgical loop, and finally the capsule of growth pulled away from the overlying brain and underlying optic nerves.

Acoustic neuromas are the second type of favorable growths. These are the well-recognized cerebellopontile-angle tumors, perfectly benign and completely encapsulated. Almost always they may be diagnosed from the clinical picture: tinnitus and increasing deafness on one side, fol-

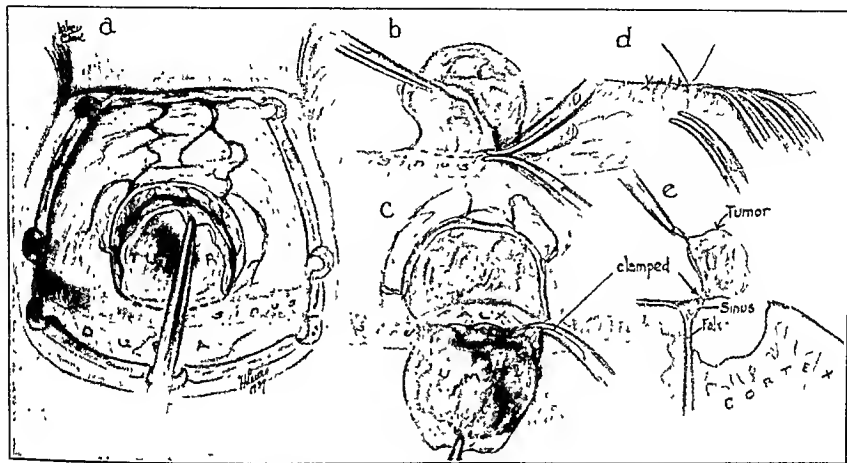


FIGURE 3. Extirpation of a Surface Meningioma.

(a) Dural incision around the tumor, attached to the longitudinal sinus. (b), (c) Tumor being tilted out. (d) Sinus ligated with silk after placement of clamps. (e) Cross-section relations (Horrax⁴, reproduced by permission of the publishers.)

are highly vascular, which makes their removal at times extremely difficult, in almost every case they are capable of complete extirpation if one has a thoroughly trained team of co-workers. At times it is essential to remove many centimeters of the longitudinal or lateral sinuses, and large areas of skull that have been invaded by tumor.

When the meningioma is attached to the dura over one of the cerebral convexities, the dura is incised around the growth, blood vessels between it and the surrounding cortex are ligated either by electrocoagulation or silver clips, and by working around the tumor in this way it can gradually be tilted out from its bed and thus completely extirpated (Fig. 3). The large growths arising from the olfactory groove and extending under both frontal lobes must be attacked in a different way. Usually the anterior part of the right frontal lobe is excised, thus exposing the upper pole of the tumor. The contents of the tumor capsule can

be removed by numbness of the same side of the face, staggering, headaches and in the later stages failing vision due to choked disks. Until recent years the common practice was to do an intracapsular extirpation of these tumors, but with this operation, although the result in some cases was good for several years, the growth always recurred and secondary operations were either unsatisfactory or carried a high mortality. I therefore always remove the tumor completely at the primary operation, and find that the mortality is no higher than that for the incomplete operation, namely, a little under 10 per cent. The one disagreeable feature of complete removal of these tumors is the resulting inevitable facial paralysis. This, however, can be overcome largely by a spinofacial anastomosis (Fig. 4). The operation as now done consists in a unilateral exposure of the affected cerebellar hemisphere, excision of the outer third of the lobe, intracapsular extirpation of the tumor

and, finally, withdrawal of the capsule by careful and painstaking separation from the pons, the trigeminal nerve and the blood vessels in the area (Figs. 5 and 6).

The third group of favorable tumors is that of the pituitary adenomas. They may be diagnosed by the familiar triad—optic-nerve atrophy, partial or complete bitemporal hemianopsia and an enlarged sella turcica, discernible by x-ray study

the hair line. The contents of the tumor capsule are evacuated, after which the capsule is removed down to the clinoid processes (Fig. 8). There is some tendency for pituitary adenomas to recur, but if so they may be reoperated on with little, if any, added risk.

Benign gliomas (usually cystic astrocytomas) are the fourth group of favorable tumors. They may occur in the cerebral hemispheres, but are

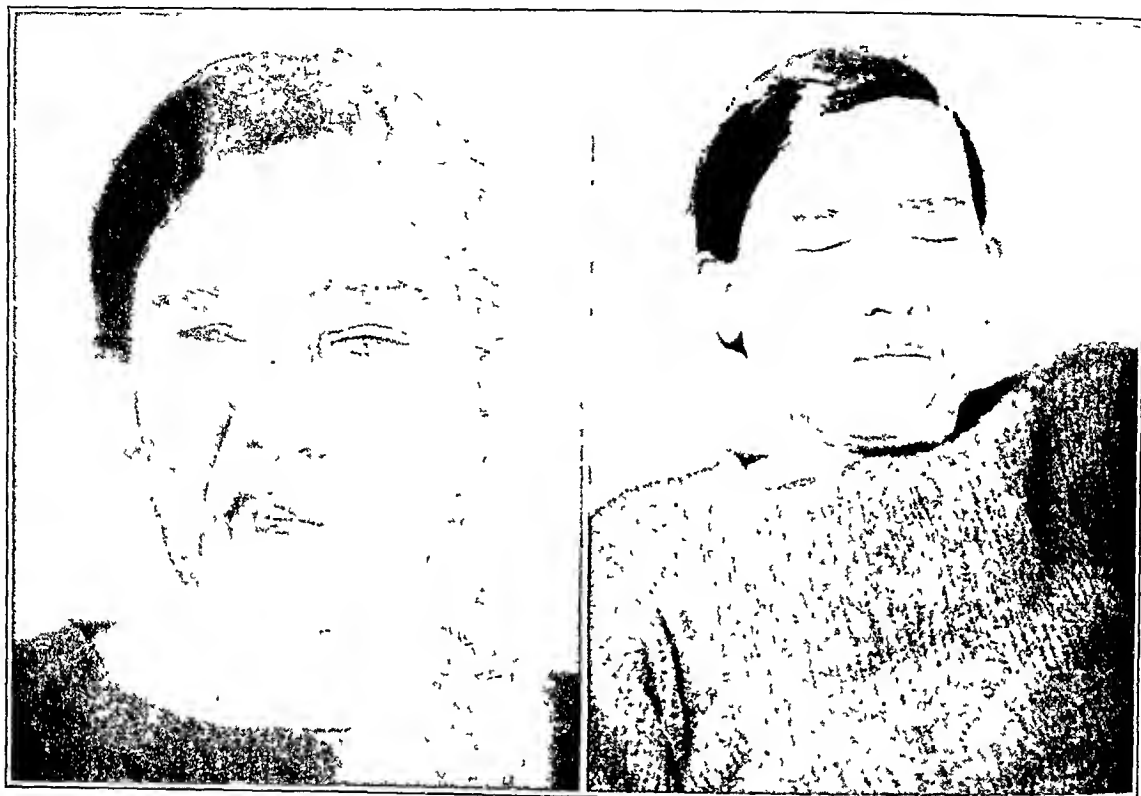


FIGURE 4. *Partially Corrected Facial Paralysis by Spino-facial Anastomosis following Complete Extirpation of an Acoustic Tumor.*

(Fig. 7). Much has been written of late years concerning the role of x-ray treatment for these growths. It is true that a certain number of patients, probably under 25 per cent, will get a recession of their visual symptoms, at least for a while, by means of x-ray therapy, and for those whose vision is not already seriously affected I should advocate a trial by radiation. Patients must be followed carefully for a considerable time, since vision may fail insidiously and subsequent x-ray treatment may not be helpful. I have had many unfortunate patients who had tried this form of treatment, were helped for a while and then were not urged to seek further relief until vision was well-nigh gone and their tumors so extensive that they were inoperable. Operations for pituitary adenomas in the stage in which they should be operated on should not carry a mortality of over 5 per cent. The growth is approached by a frontal bone flap from an incision concealed within

commoner in the cerebellum and most frequent in children. The story is often one of intermittent bouts of headache and vomiting. Neurologically, cerebellar signs and symptoms are as a rule outspoken. Whenever found, the cystic portion of the tumor is evacuated, and the solid portion completely extirpated by electrosurgical methods (Fig. 9). After this, it is never necessary to remove the cyst wall or to fix it with hardening or sclerosing solutions.

In the miscellaneous group of tumors, attention should be called to a few of the outstanding points. Hemangiomas of the cerebellum occur in adults and give the usual cerebellar symptomatology, together with pressure signs. Just as in astrocytomatous cysts, the cavity is evacuated and the mural nodule—usually bright-red—is excised. The angiomas are dealt with almost entirely by electrocoagulation and occasionally by subsequent x-ray therapy. Colloid cysts of the

third ventricle are uncommon, but are small tumors about the size of a cherry, situated at the foramen of Monro. They give no localizing signs and are always diagnosed by ventriculography. They are removed after exposure of the foramen by a cortical incision down to the dilated ventricle. The favorable craniopharyngiomas (cysts of Rathke's pouch) are approached and removed by the usual frontal craniotomy employed for pituitary adenomas. Many tumors of this type are

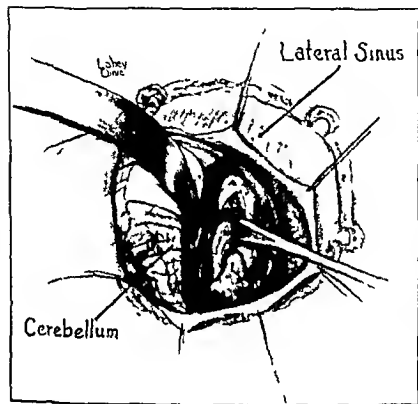


FIGURE 5 Preliminary Excavation of an Acoustic Neuroma after Excision of the Outer Third of the Cerebellar Hemisphere (Horrax and Poppen⁵ reproduced by permission of the publisher)

extremely extensive and adherent to important basilar nerves and arteries and therefore are not included in the favorable list. A few pinealomas are capable of complete extirpation by radical operative exposure, and I have two patients with these tumors who have survived three and seven years respectively. Cholesteatomas (pearly tumors) are rare but almost always favorable.

As stated previously, this study concerns the present status of 224 patients who were considered to have favorable brain tumors out of a total series of 400 verified tumors of all types. Deducting the postoperative and subsequent deaths, there have so far been 187 survivors. Since the operations on these patients dated from November, 1932, to June, 1939, it is obvious that the follow up record varies from slightly over one to nearly eight years. It is fully realized that a greater time interval would have given a much more accurate picture, but the figures here presented are offered for what they are worth.

In going over the follow up data of the 187 survivors, it is obvious that 27 have major disabilities or handicaps that prevent them from living useful

lives.* Among the meningiomas, partial motor paralyses and convulsions are the outstanding features. Patients who have had acoustic tumors show residual ataxia, in a few cases sufficient to keep them from work. Three of the acoustic patients had become blind before they presented themselves for operation, and blindness from such secondary atrophy is almost never capable of any useful return of vision, even though intracranial pressure is entirely reduced. Blindness, however, is even more prevalent among the pituitary adenomas. This means that the tumors had almost certainly been present for many years before the malady was diagnosed, or else, as mentioned previously, x-ray treatment had been continued for too long a time without adequate checking up. But whatever the cause of disability, by far the

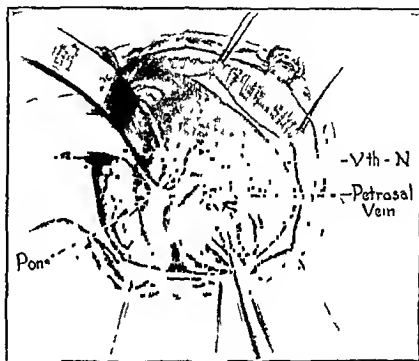


FIGURE 6 Extraction of the Remaining Acoustic Tumor Capsule after Separation from the Trigeminal Nerve and Other Neighboring Structures (Horrax and Poppen⁵ reproduced by permission of the publisher)

greater portion of them could have been prevented by an earlier diagnosis and an earlier removal of the tumor.

Going back to the 187 surviving patients, therefore, and deducting the 27 who have severe disabilities, one obtains a final total of 160, or 71 per cent of the original 224 with favorable tumors, who not only have survived but are leading useful lives with little or no functional loss.

605 Commonwealth Avenue

*One patient although completely blind has not been included in this list because he has carried on an important executive job ever since his operation in spite of visual loss.

REFERENCES

1. van Wageningen W. P. Verified brain tumors and results of one hundred and forty-nine cases eight years after operation. *J. A. M. A.* 102:1454-1458, 1934.
2. Cairns H. The ultimate results of operations for intracranial tumors: a study of a series of cases after a nine year interval. *Can. J. B. & Med.* 4:421-472, 1937.

3. Eisenhardt, L. Long postoperative survivals in cases of intracranial tumor. *A. Research Nerv. & Ment. Dis., Proc.*, 1935. 16:390-416, 1937.
4. Horrax, G. Technical steps in removal of certain meningiomas of cerebral convexities. *S. Clin. North America* 19:727-738, 1939.
5. Horrax, G. and Poppen, J. L. Experiences with the total and intracapsular extirpation of acoustic neuromata. *Ann. Surg.* 110:513-524, 1939.
6. Horrax, G. Surgical treatment of pituitary tumors. *A. Research Nerv. & Ment. Dis., Proc.*, 1936. 17:665-682, 1938.

DISCUSSION

DR. WILLIAM J. MIXTER, Boston: Dr. Horrax has given us a very valuable résumé of his cases of brain tumor. His

is the malignant glioma that has given brain surgery more or less of a bad name.

I believe that one of the advances that will come in the surgery of brain tumor will be our ability to recognize these malignant cases without turning down an osteoplastic flap. Should we be able to achieve this, we shall be in a position to eliminate exploratory operations in many of these unsatisfactory cases.

DR. ELLIOTT C. CUTLER, Boston: I should like to ask Dr. Horrax whether the nodule in the so-called "fibrillary astrocytoma" is the basis for the output of the fluid in the cysts. It is difficult to comprehend how glial cells can



FIGURE 7. Typical Ballooned-Out Sella of a Pituitary Adenoma, with Erosion of the Posterior Clinoid Processes.

results are better than the published results of many other clinics.

A person discussing a paper should stick to the paper and should not bring up some new topic; nevertheless, I am going to branch out somewhat. Dr. Horrax said little about the cystic hemangiomas. He stated that as a rule they are favorable cases, easily missed and rather difficult to handle. That is true. The patients frequently come to us without a diagnosis, and we often miss the diagnosis ourselves. Mistakes would be less frequent if careful examination of the whole of the fundus were the rule, particularly in cases of tumor of the cerebellum. Hemangioma of the retina is often associated with hemangiomatous cyst of the cerebellum.

Dr. Horrax spoke of the higher mortality in cases of malignant tumor. That has been our experience also. It

secrete fluid. I have long thought that the fluid must come from the capillary bed in the mural nodule and not from cells of the nervous system. I wonder whether on careful study the mural nodules of fibrillary astrocytomas show some relation to the capillary hemangiomatous type that Dr. Mixter has spoken about, and whether Dr. Horrax considers the fibrillary astrocytomatous cysts to be burned-out or partly burned-out hemangiomas.

DR. DONALD MUNRO, Boston: Dr. Horrax's presentation and figures are most encouraging. I do not know when I have heard any set of figures that stimulated me more. It is wonderful to have such an encouraging report come out about brain tumors, and I am sure all of you who see an occasional brain tumor realize that such encouragement is long overdue.

I should like, however, to present another point of view—that of the surgeon who sees brain tumors in the course of all the varied mixture of crises that comes into a non-specialized clinic. I do not see many patients with brain tumors; they usually have other diseases of the central nervous system. Those that I do get are able to have

cludes a type of tissue that is blastomitous; the patient's life expectancy is only a year. That is well known, but what has not been so well recognized and brought out so clearly before is that mixed with the unfavorable type of cell there may be a very favorable type, and unless a great amount of tissue is provided for the pathologist to

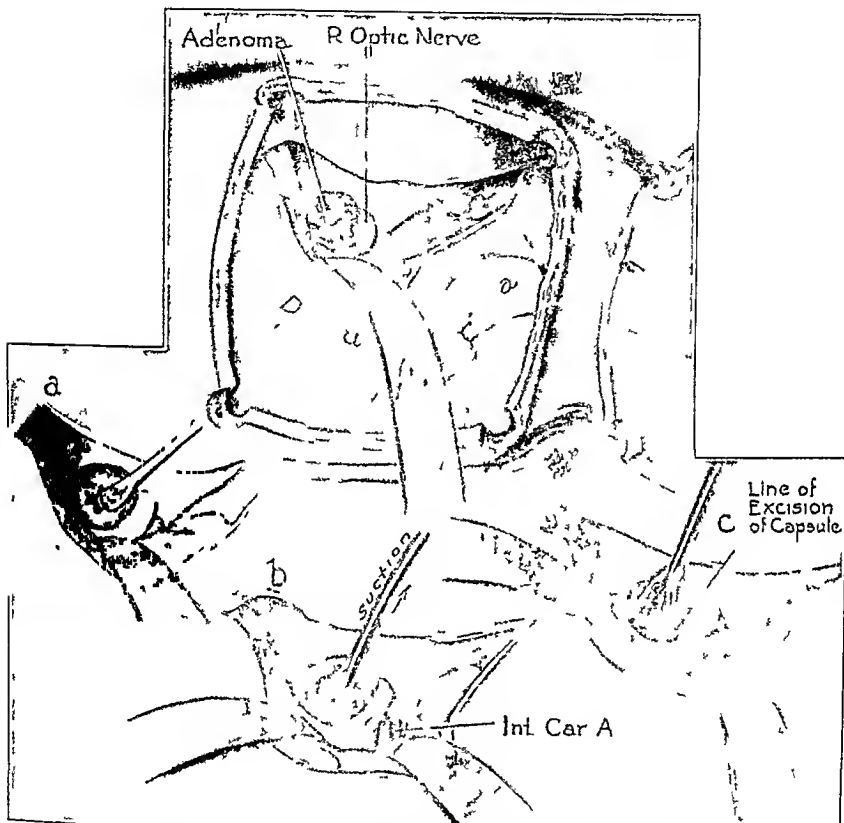


FIGURE 8 Stages in the Operation for Removal of a Pituitary Adenoma

Through a right frontal bone flap the dura is retracted and incised exposing the tumor between the optic nerves. The contents are removed by spoons and suction. The capsule is excised down to the sella (Horrax reproduced by permission of the publisher)

been neglected or to have been undiagnosed for a long time. I should accordingly like to emphasize a point that I know Dr. Horrax believes in but did not have time to speak of and that is based on my experience with this particular group of tumors.

I have had 142 verified tumors. Fifty-nine per cent were gliomas. I have not classified them into favorable and unfavorable types, but that is a higher percentage than one would expect in a more segregated group of tumors.

A recent study has demonstrated that if any glioma in

examine a favorable prognosis may be given whereas in fact the tumor is an unfavorable type of tumor.

This leads me to the first point to be emphasized, namely that it is in my opinion impossible to make an adequate prognostic diagnosis of any given brain tumor unless that tumor is exposed at operation.

Another important thing and another reason for exposing all brain tumors or suspected brain tumors is that the ultimate end result of many of these cases depends in part at least, on the situation of the tumor. Many favorable types of tumors have a bad prognosis because

they are so situated that they cannot be removed without producing death or a very bad invalidism from paralysis; therefore, what I should like to emphasize, and what I am sure Dr. Horrax would have emphasized had he had time, is that if a patient is suspected of having a brain tumor, particularly when there is any suggestion of localization, one should not neglect to provide that patient

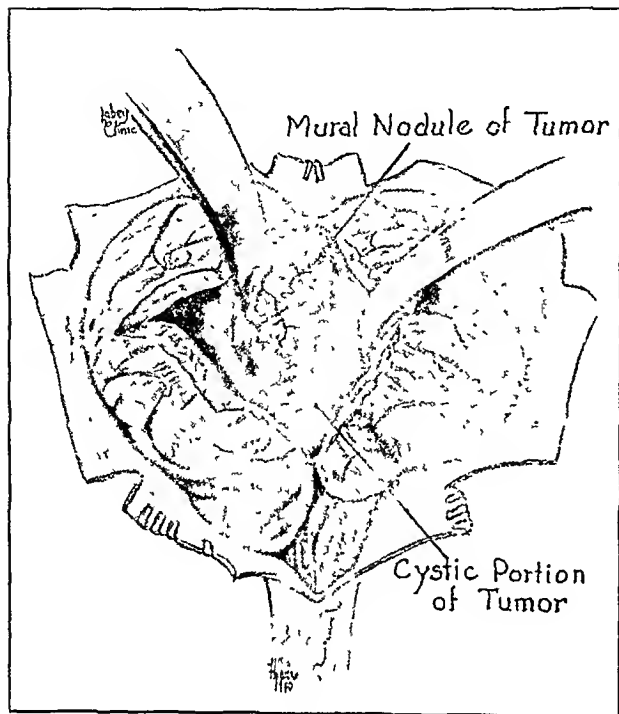


FIGURE 9. *Cystic Astrocytoma of the Cerebellum, Showing the Solid Portion of the Tumor in the Cyst Wall.*

with the ultimate in diagnostic means; that is, all such patients should be explored early and thoroughly. If the tumor is found, large amounts of the tissue should be taken out so that the pathologist can, in his turn, give a thoroughly accurate and adequate estimate of the prognosis. Only then has one the right to tell the patient that he is going to be well, or that he is going to die in any given time. Unless one has that specialized information, one is as liable to be wrong as to be right about this vital point.

DR. THOMAS H. LANMAN, Boston: I am speaking for Dr. Franc Ingraham, of the Neurological Service at the Children's Hospital. He has been very anxious to bring out one point with which he has been greatly impressed in dealing with brain tumors in children.

Dr. Horrax has mentioned the favorable nature of astrocytomas. Dr. Ingraham has found that these constitute a rather high percentage of the tumors found in children. He believes very strongly that the diagnosis between astrocytoma and medulloblastoma cannot be established without exposing the tumor. He is therefore convinced that exploration should always be done, and that radiation without a previous accurate diagnosis will result, and has resulted, in dangerous delay. The patient with astrocytoma has a fairly good prognosis after surgical removal of the growth.

DR. HORRAX (closing): In regard to Dr. Cutler's question concerning the cells and their secretion in the astrocytomatous cysts, I have not made a special study of this problem. The tumors grossly are usually so different that it would lead me to suspect that they must be somewhat different in their histologic aspects, though doubtless all have the same function of producing fluid. I assume that the fluid must come from some product generated in the cells, rather than that it is an influx from the cerebrospinal fluid, because the cerebrospinal spaces do not connect with the cysts. Many hemangiomas cysts, but not all, have a bright-red nodule. An astrocytomatous cyst has a brownish and almost always a much larger nodule, but I have not studied the histology of the cells from the standpoint of secretory activity, so that I cannot say whether they are alike in this respect. They are both very favorable and not infrequent lesions, however.

Dr. Mixer's prophecy in regard to the ability to diagnose malignant tumors will undoubtedly come true, but we certainly have not reached that stage yet. Many people are doing various types of study to see if they can diagnose malignant tumors, and differentiate a glioblastoma from some of the more benign types, but not until we have reached that stage can we dispense with exploring, as Dr. Munro has said. I think, as Dr. Cushing did, that one must also do a very radical operation; in fact, I always try to take out all the tumor tissue possible, because, as Dr. Mixer and Dr. Munro have emphasized, many tumors will be of the mixed type and may have a prognosis of three, four, five or even ten years of perfectly good health before the symptoms recur.

I agree with Dr. Ingraham about the astrocytomas and medulloblastomas. The latter do respond to x-ray treatment, but there is no sure way of diagnosing them beforehand. When one has made a diagnosis of a tumor in a child, what to do is another question. One can take out some of it or remove as much as possible, but it is very difficult, at least in our hands, always to be sure preoperatively whether one is dealing with an astrocytoma or a medulloblastoma.

TUBERCULOSIS OF THE CECUM*

RALPH ADAMS, M.D.,† AND LANGDON J. PARSONS, M.D.‡

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TUBERCULOSIS of the cecum is an uncommon disease in the wards of the Massachusetts General Hospital, where 79 cases of intra-abdominal tuberculosis have been diagnosed from 1924 to 1939. Thirty-eight of these are eligible for classification as tuberculosis of the cecum.

Attention was drawn to a consideration of this disease because the treatment of tuberculosis of the cecum in general hospitals seems to be poorly standardized. The question of whether surgical approach to the disease has any advantage over prolonged rest and supportive treatment, as in the pulmonary form, appears debatable. Naturally, the surgeon accepting a patient will be guided in his technical procedures by the extent and nature of disease encountered, but there is little agreement as to the best method to follow in a favorable case.

The usual history was one of infrequent colicky pain without radiation, centered around the umbilicus or localized in the right lower quadrant. The pain was associated with varying degrees of distention and was often relieved by pressure over the abdomen and by the passage of flatus or bowel movement. It seemed to have little relation to meals. Frequently there was a vague sense of discomfort in the right lower quadrant. As the symptoms became more frequent and severe, the pain was associated with vomiting. The severity of the pain and vomiting depended, in large measure, on the degree of obstruction. Increasing constipation, with failure to obtain relief by catharsis, and an increasing reliance on enemata were natural sequelae. Blood or mucus was or was not found in the stools, depending on the type of tuberculous process. The ulcerative form was less common than the hyperplastic in the older patients, and this fact probably explains the infrequency of melena in this age group. The changes observed in bowel habits tended toward diarrhea in the younger patients and almost invariably toward constipation in the older ones. All these symptoms were in the nature of obstructive episodes of gradually increasing severity. This is shown by the duration of illness, which began, for the most part, from six months to one year preceding admission. Rarely were the symptoms acute.

A train of generalized systemic complaints ac-

companied the localized obstructive symptoms. Ninety per cent of the cases had lost from 15 to 45 pounds within a year. The appetite was but little disturbed. Half the patients had symptoms referable to the lungs, although in several cases with no symptomatic evidence of pulmonary tuberculosis disease in the cecum had reached an advanced stage. All the patients who complained of thoracic symptoms were found to have advanced pulmonary tuberculosis. Contrary to expectation, only 19 of the 38 patients had physical signs of disease in the lung. This was of long duration in most cases, was readily noted on physical examination and was confirmed by x-ray examination.

An irregular mass with tenderness and spasm was observed in half the cases. It was characteristically extensive and fixed to the right lateral abdominal wall. Slight elevation of temperature (99.5 to 101.0°F.), with a correspondingly elevated pulse, was a common finding. The degree of emaciation depended on the extent of disease. The abdomen was distended in 7 cases, in each of which the patient had a mass in the right lower quadrant.

In contrast to the usual observations in other right-sided colonic lesions, notably carcinoma, only slight pallor and anemia were noted, despite the degree of emaciation. The red-cell count was never below 3,800,000, even in the advanced cases, and the hemoglobin reading was rarely below 70 per cent. A slight leukocytosis, from 13,000 to 15,000, with a rise in polymorphonuclear cells to 80 per cent, was commonly observed, as was an increase in the mononuclear cells to around 10 per cent. A positive guaiac test in the stools was not very helpful, for although 44 per cent of the cases were far advanced, positive examinations were reported in only 4 cases. Tubercle bacilli were demonstrated in the sputums of 13 cases.

The radiologists frequently observed spasm of the cecum to the point of incomplete filling, associated with a fixed, rigid, irregular and deformed ascending colon in many cases. These findings are often referred to as the "Steirlin defect." Attempts to confirm the findings of barium enema by a gastrointestinal series usually failed to provide additional information. A correct diagnosis was not made in 2 cases on the first admission because the gastrointestinal series was negative and a barium enema was not given. The commonest error in x-ray interpretation was to confuse the

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lesion with carcinoma of the cecum. The failure to find positive evidence of tuberculosis, either on physical examination or by fluoroscopy of the chest, contributed to the faulty diagnoses. A characteristic x-ray report reads as follows: "Tuberculosis unlikely because of negative chest findings." One third of the patients over thirty-five years of age, and nearly half the patients, had the disease in the absence of clinical or x-ray evidence of pulmonary disease.

CASES OPERATED ON

Seventeen patients were subjected to a laparotomy. These cases were of the greatest help in determining the proper course of future treatment.

Exploratory Laparotomy

Four patients had only an exploratory laparotomy, with the added excision of a mesenteric lymph node for biopsy in 2 cases.

CASE 1. A 25-year-old woman was found to have tuberculous colitis in addition to cecal involvement. The appendix had been removed at another hospital, and a microscopic diagnosis of tuberculosis was available. The evidence was thought insufficient for resecting the cecum, since rectal bleeding, from which the patient suffered, might be arising from a lower point in the colon. Only a calcified gland was removed. She made a good convalescence and recovered on a regimen of rest.

CASE 2. A 28-year-old man was explored, with a pre-operative diagnosis of acute appendicitis. A thickened, inflamed cecum was found, adherent to the right lower abdominal wall. The appendix could not be found and hence was not removed. A necrotic mesenteric node was excised for biopsy. The patient made an uneventful recovery.

CASE 3. A 45-year-old man was operated on following a diagnosis of appendiceal abscess. Tuberculosis was recognized as the cause of the cecal mass. The appendix was not removed. One year later, after following a hygienic regimen for several months, he was well and working.

CASE 4. A 39-year-old woman was an excellent subject for study, because progress of the disease was visualized at successive operations. Active tuberculosis of the intestines, with adhesions around the cecum, was seen at the first operation, done for a pelvic disorder. Inactive lesions were seen at a second laparotomy on the pelvic viscera. The patient is well and working.

It should be noted that no untoward effects followed the removal of mesenteric nodes in either Case 1 or Case 2. Cases 2, 3 and 4 illustrate the wisdom of noninterference. The appendix was not molested, and no sinuses developed. The patients recovered on a sanatorium regimen and are now arrested cases. Case 3 particularly emphasizes the courage required to withhold appendectomy, and the successful result that ensued.

Ileostomy

Three cases had an ileostomy only. Each had extensive intestinal disease, with mechanical ob-

struction in the right lower quadrant. Two were relieved of their obstruction but died of progressive tuberculosis. The third patient was dramatically relieved of pain, distention and diarrhea but died of a pulmonary embolus on the sixteenth post-operative day. These 3 cases were beyond the reach of hopeful therapy. They do illustrate the relief and comfort that may come from palliative operations on even badly ulcerated, tuberculous bowel. The principle is, of course, the same as that sometimes applied in ulcerative colitis. Ileostomy should be reserved for extensive cases with obstruction or profound irritative symptoms, when active disease in the lower bowel makes anastomosis doomed to failure.

Anastomosis Only

Three patients had a sidetracking anastomosis, 2 in addition to appendectomy.

CASE 8. A 33-year-old man first had drainage of an appendiceal abscess. Three months later, he was readmitted with a fecal fistula and a mass in the right lower quadrant. There was advancing right apical pulmonary disease, and a spastic, nonfilling, deformed cecum was demonstrated by x-ray examination. Palpable involvement of the bowel extended to the mid-transverse colon at the second operation. The process was too extensive for resection. An ileosigmoidostomy was done. The sinus continued draining, and the patient was sent to a sanatorium. No new sinuses developed, but he died several months later of tuberculosis.

CASE 9. A 28-year-old woman was explored for sub-acute appendicitis. A mass surrounded the cecum. The appendix was removed, and the stump buried. An ileo-transverse colostomy was done. A sinus developed from the tip of the cecum within 3 months. This sinus healed on sanatorium treatment within a year, and the patient was discharged as an arrested case, 18 months after the onset of disease.

CASE 10. A 60-year-old woman with far-advanced disease had an ileocolostomy but died 5 weeks later of debility and retroperitoneal sepsis. Post-mortem examination showed tuberculous colitis and ileitis, and retroperitoneal abscess. Clinically, the patient had been thought to suffer from carcinoma of the cecum.

The error in Case 8 was in expecting an actively infected bowel to heal. The second operation probably can be regarded only as an additional burden on an already overtaxed patient. Case 9 was one with relatively quiescent disease. The anastomosis was done between nondiseased loops of bowel and remained secure. An ideal situation existed for general rest in a sanatorium and for local rest of the diseased part by the sidetracking anastomosis, and the sinus that developed from the active focus in the cecum closed quickly. A sidetracking anastomosis probably offers the best hope of arrest in such a case, characterized by an obstructive mass and persistent localized activity. The anastomosis should be done between unin-

involved portions. Suture lines in the involved bowel frequently leak and are followed by sinus formation. An opening into the actively diseased cecum also invites sinus formation. Appendectomy increases the likelihood of this complication.

Resection

Resection and anastomosis were done in 7 cases.

CASE 11 A 55 year old carpenter entered the hospital with cramplike lower quadrant pain, and increasing constipation of one year's duration. There was a tender 6-cm mass in the right lower quadrant. A barium enema showed a constant filling defect in the cecum. The resected mass contained tuberculous pus. The patient had a good immediate convalescence and was lost from follow-up. Probably he died from his active pulmonary tuberculosis with cavitation.

CASE 12 A 38 year old unemployed Chinese entered the hospital in 1931, complaining of recurrent crampy abdominal pain and a loss of weight of 30 pounds within a year. A firm, tender, irregular mass filled the right lower quadrant. The chest was normal on physical and x-ray examination. A spastic cecum surrounded by a mass was demonstrated by barium enema. There was a 7.5-cm area of constriction in the proximal transverse colon. Tuberculosis was thought unlikely because the chest plate was negative. Two operations for incision and drainage of a pericecal abscess were done prior to the main operation which consisted of resection of the terminal ileum, ascending colon and first portion of the transverse colon. A lateral anastomosis was done. These operations revealed the abdomen to be free of disease except for the right lower quadrant and the right iliac fossa, where a posterior perforation had occurred from the cecal mass. The terminal ileum was infiltrated and thickened. Pathological examination revealed tuberculous ulceration of the cecum, ascending colon, and the distal 5 cm. of the ileum. The patient made a good recovery and is now well and working.

The diagnosis before and after operation in Cases 11 and 12 was thought to be carcinoma of the cecum. Involvement of the ileum should have suggested tuberculosis to the surgeon. The fact that the remainder of the abdomen was free of disease, however, made the diagnosis of tuberculosis unlikely. Undoubtedly, it is better to resect an active tuberculous cecum occasionally than to leave in place a carcinomatous cecum that is favorable for resection and cure.

CASE 13 A 58 year old housewife was admitted in 1935, complaining of two attacks of cramplike abdominal pain within a year. There was a tender fixed mass in the right lower quadrant. A chest plate showed contracture of both apices consistent with inactive tuberculosis. A barium enema suggested ileocecal tuberculosis because of widespread mucosal destruction and scarring of the cecum and the ileocecal valve. Scirrhus carcinoma also was suggested because lack of spasm and lack of ileal involvement made the diagnosis of tuberculosis uncertain. Absence of change in bowel habits and freedom from blood favored tuberculosis as against carcinoma of the cecum. The surgeon's opinion was confirmed by pathological examination which showed ulcerative and hyperplastic tu-

berculosis of the ileum and the cecum. The patient is well and working.

CASE 14 This patient, a 44 year old housewife gave a history of various isolated episodes of diarrhea for many years. She had lost 23 pounds after an increase in diarrhea 6 months previously. There was occasional blood streaking of the stools. There was tenderness in the right upper quadrant. Chest examination was negative but x-ray examination of the chest was not made. The barium enema met definite obstruction just below the hepatic flexure and showed deformity and narrowing of the cecum and ileocecal valve. The rugae were obliterated. The findings were considered typical of cancer. Carcinoma of the cecum was the only diagnosis considered until the resected specimen was examined histologically and tuberculosis was found. Extensive old abdominal adhesions were the only clue to the diagnosis at the time of operation. The appearance of the local lesion was entirely consistent with carcinoma. There were acute intestinal obstruction and abdominal abscess postoperatively. She has continued to have recurrent attacks of diarrhea, with mucus and occasional blood, since operation six years ago, and is unimproved. Presumably chronic tuberculous colitis has continued to cause her symptoms.

CASE 15 An 18 year old boy was admitted complaining of abdominal cramps, malaise and anorexia of 6 months duration. There were mucous diarrhea without blood and a loss of 25 pounds in weight. The chest was clear by physical examination, but on x-ray examination the hilar shadows were increased. The patient was emaciated. There were slight tenderness and spasm in the right lower quadrant. A barium enema showed spasm of the ileum and cecum. An abscess surrounded the cecum. The ileum was thickened and dilated. The walls of the cecum were red and granular, and there were two narrowed areas in the ascending colon. Right colectomy and ileotransverse colostomy were done. Pathological examination showed the bowel walls to be thickened and the mucosa to be red granular and superficially ulcerated. The diagnosis was established microscopically. The patient failed to close a postoperative cecal fistula during several months' rest in a sanatorium. He was discharged against advice with a fistula but with great improvement over his preoperative condition.

In Case 15, the boy improved postoperatively on a sanatorium regimen, it is true, but several factors suggest that operation might wisely have been postponed indefinitely, and that he might have done equally well on a medical regimen exclusively. The preoperative diagnosis was probable tuberculosis. The alternative diagnoses of appendicitis and carcinoma could be excluded with reasonable certainty on the clinical and x-ray data and because of a white cell count of 10,000 and 70 per cent polymorphonuclear cells. The patient was emaciated and in poor condition for any elective operation. The likelihood of activity and poor results because of youth might have been considered more serious contraindications than they apparently were. The cecal fistula was an added burden. The improvement postoperatively is more likely due to the good sanatorium care than to the operation.

CASE 16. A 44-year-old American chemist was admitted in 1937, complaining of increasingly frequent attacks of abdominal pain accompanied by nausea, vomiting, and occasionally diarrhea, for five years. The episodes could be avoided by a regimen of mineral oil and liquid diet. He had had pulmonary tuberculosis 19 years previously, with a recurrence 13 years previously. He was undernourished. There was a movable, slightly tender mass in the right lower quadrant. A barium enema showed a filling defect in a shortened, scarred cecum. The terminal ileum was dilated but could not be filled with barium. A right colectomy was done. The convalescence was uneventful, and the patient is now well and working, 2 years after operation.

CASE 17. A 55-year-old woman was well for 7 years following a right colectomy, anastomosis and sanatorium convalescence in 1926. The procedure was done for purely obstructive symptoms caused by inactive constricting tuberculosis and scarring of the cecum. Tuberculosis of the lung had existed fifteen years before admission to the hospital, with clinical arrest, and an x-ray plate of the chest showed healed tuberculosis at the right apex. Presumably, there was also tuberculous enteritis thirteen years previously. Poverty in 1933 caused undernutrition, and there have been recurrent periods of diarrhea and pain since that time. There is now a mass in the left upper quadrant, but debility and old age preclude consideration of further operative procedure.

The patients in Cases 16 and 17 represent the type that obtained most benefit from surgery. In contrast to the youth in Case 15, their tuberculosis was quiescent, the disease was localized and the symptoms were purely obstructive in origin. Consequently, a direct attack on the involved cecum was tolerated. In the peritoneal cavity, as in the lung, pleura or bone, surgical attack on active tuberculosis results usually in disappointment for the surgeon and grief for the patient. It seems futile to attempt extirpation of active disseminated colonic tuberculosis. In cases properly selected for resection, the suture lines have caused little trouble. No unusual principle is involved in selecting a site for anastomosis, beyond the choice of a bowel free from gross evidence of previous involvement.

In summary, then, of the 7 cases on which resection was done, 3 patients are well and working, 1 is improved, 1 was relieved for seven years, after which the disease recurred, 1 was unimproved and 1 presumably died of generalized tuberculosis.

CASES NOT OPERATED ON

Twenty-one patients remain on whom no operation was done. In 9 of these, advanced generalized tuberculosis—of which cecal disease comprised only one major part—precluded consideration of any operative procedure. All 9 are dead.

Ten patients had extensive disease in the cecum and frequently elsewhere, but a hygienic regimen was advised instead of operation after weighing

the merits of each case. Three of this group of 10 grew steadily worse until death, and a fourth is near death from pulmonary tuberculosis. Three patients have had arrest of their disease but remain unemployed. Three patients are well and working. Two of these 3 deserve special mention because they had associated pulmonary disease requiring thoracoplasty. No operation was performed until a rigid sanatorium regimen had caused the intestinal lesions to become quiescent; the thoracoplasties were then done. The intestinal disease remained quiescent. Complete clinical recovery resulted in each case.

An operation on one focus of tuberculosis will often cause any active focus elsewhere in the body to become worse. Experience has proved that this relation is unusually close between the lungs and the intestinal tract. A patient with a single lesion should demonstrate ability to localize it, and a person with two lesions should demonstrate ability to arrest one of them before being considered for elective operation. That this conservatism on the part of thoracic surgeons is no idle fear is indicated by one of the cases mentioned above as arrested but unemployed, which began a fulminating ileocecal tuberculosis immediately after a second-stage thoracoplasty.

Two patients who were urged to have operation and refused further illustrate the reparative processes that may occur under favorable hygienic conditions.

CASE 18. A 24-year-old man was seen in 1931 with diarrhea, periumbilical pain, night sweats, weakness and passage of mucus in the stools. The cecum and terminal ileum were spastic, poorly filling and tender. After two years of sanatorium care, the lesion could no longer be seen by x-ray examination. The patient did work as a cabinetmaker for one year, and the symptoms recurred. The disease again was shown by x-ray examination, and operation was advised. Again it was refused. A hygienic regimen was established. The patient was seen in 1934, 3 years later, when he was gaining weight and doing light work. A gastrointestinal series and a barium enema showed a deformed cecum but an apparently healed gastrointestinal tract. There was no pulmonary disease. He was last seen in 1939, eight years later, in "the best condition in many years."

CASE 19. A 60-year-old woman complained of increasing distention, intermittent pain in the right lower quadrant, belching of gas and flatus for one year. The pain had become colicky in the few days preceding entry. There was a chronic cough of many years' duration. Subacute obstruction subsided on the ward. Investigation disclosed a collapsed right middle and right lower lobe. A barium enema showed an extensively deformed and scarred cecum, with a very narrow ileocecal lumen. The rest of the bowel looked normal. A proctoscopy was negative. The sputum was negative for acid-fast bacilli. There was no blood in the stools. The patient was strongly advised to have an operation for subacute intestinal ob-

struction, probably due to tuberculosis of the cecum. Thus she absolutely refused to consider. She has led a quiet life at home on a soft bland diet and has had no further gastrointestinal symptoms. She can eat anything she wishes. There is one bowel movement a day without mucus or blood.

SUMMARY AND CONCLUSIONS

The chief value of reviewing a small group of patients with tuberculosis of the cecum is that these cases represent the problem as seen in the community, inasmuch as they are drawn from the wards of a general surgical hospital. For example, it has long been an impression, gathered largely from reports of tuberculosis sanatoriums, that the absence of clinical or x ray findings of pulmonary tuberculosis tends to rule out tuberculosis of the cecum, thereby contributing to the diagnosis of carcinoma of the cecum, with which it is most often confused. Yet 19 of the 38 cases reviewed in this series failed to show either clinical or x ray evidence of tuberculosis in the lungs. Another point of interest in the differential diagnosis between carcinoma and tuberculosis may be found in the relatively normal blood picture, despite marked cachexia, commonly observed in tuberculosis, in decided contrast to the profound anemia often present in carcinoma of the ascending colon, even in its earlier stages.

Despite these observations and the fairly characteristic x ray picture of tuberculosis of the cecum when spot films are employed, the differential diagnosis between tuberculosis and carcinoma cannot always be made. Exploration is, therefore, indicated. The problem, then, is in proper evaluation of the pathologic lesion, which in most cases is extensive. Involvement of the terminal ileum contributes to the diagnosis of tuberculosis. The commonest error is the failure to estimate adequately the degree of activity of the tuberculous process after carcinoma has been ruled out. Extensive surgery involving resection of the right colon, in the presence of active disease, encounters risk of failure. Temporizing procedures, such as appendectomy, frequently produce distressing fistulas. When sanatorium care has followed exploration alone, excellent results have been obtained. Surgical intervention is theoretically sound only to relieve acute obstruction or to remove obstructive sequelae of an arrested infection, and in practice the theory is fairly well substantiated. A sanatorium regimen should precede surgical intervention in practically every case, because tuberculous activity can be halted only by tissue resistance, and because rest is the best aid to healing.

VITAMIN C SURVEY IN DIABETES*

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CINCINNATI

THE relation of vitamins to human nutrition has recently been widely studied, and the basic importance of certain vitamins in cellular metabolism has become evident. In a metabolic disease such as diabetes, there is a profound disturbance of carbohydrate storage and utilization, and the effect of vitamins may become particularly important. Possible vitamin B inadequacies in diabetic patients were discussed in a previous paper,¹ and the effects of administering various vitamin B fractions to well controlled diabetic patients were reported. No evidence of inadequacies was found.

This paper reports a survey of the vitamin C

status of 125 diabetic patients to determine how much vitamin C is actually eaten, and to see what relation exists between vitamin C and the severity of the disease.

Sebesta, Smith, Fernald and Marble² have recently published the results of a study of the vitamin C status of 49 diabetic patients who were observed at the New England Deaconess Hospital. Their results indicated an excellent state of vitamin C nutrition. Only 1 patient showed a fasting blood ascorbic acid level below 0.40 mg per 100 cc, 12 patients (24 per cent) showed levels between 0.40 and 0.80 mg, and the remaining 36 (74 per cent) had blood levels over 0.80 mg. On the five-hour-1000 mg saturation test,³ only 13 (26 per cent) showed an excretion under 400 mg. The authors suggested that the values were not representative because their patients were of the higher economic groups, and that the findings of a large public clinic might be quite different.

The Diabetic Clinic of the Cincinnati General

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†This study constitutes part of the activities supported by the Espy Fund for research in diabetes.

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Hospital offers an unusual opportunity to study the vitamin C status of patients in low economic groups. It is entirely a charity clinic, supported by city and county funds; no patient who can afford the services of a private physician is admitted for treatment. Over 30 per cent of the patients are on direct relief, 20 per cent are supported by private industry, and the remainder are on WPA, old-age pension, veterans' benefit or some other form of charity.

Even though the food expenditure in our clinic averages only \$2.10* a week, an attempt is made to design all diabetic diets so that they are adequate in protein, minerals and vitamins. We believe that any dietary lack, particularly with reference to the vitamins, is more a failure of co-operation or a lack of funds than an inherent fault of the diet. Diet classes are held weekly to acquaint diabetic patients with the benefits of raw fruits and vegetables, in the hope that whenever possible they will select foods high in vitamin content.

METHOD OF STUDY

One hundred unselected "old" diabetic patients, who were being followed regularly in the clinic, were studied during a period extending from February to June, 1940, and 25 "new" patients with no previous treatment were also observed. Blood samples were taken either fasting or when, by special arrangement, no food containing vitamin C had been eaten for breakfast. The method of Farmer and Abt⁴ was used for the blood ascorbic acid determination. The dye (2,6-di-chloro-phenol-indophenol) was refrigerated in a glass-stoppered brown bottle and was standardized against a known solution of Cebione† at intervals of two to three weeks.

Thirty-five cases were selected for an estimation of the vitamin C content of the diet. Patients were asked to keep a daily record of the type and amount of vegetables, fruit and meat eaten. The sizes of the portions were recorded in common household measures. The diets were first evaluated for *dependable* sources of vitamin C, such as citrous fruits, tomato juice and raw vegetables, and then for *uncertain* sources, such as cooked fruit and vegetables. The table compiled by Bessey⁵ was used for estimating the vitamin C content of the various foods. The small amounts in milk and meat were disregarded. Dependable and uncertain sources were calculated separately and then divided by the number of days the diet was ob-

served, so that the final figures represent the average daily intake from all sources.

Individual diets were prescribed for each patient, the daily intake ranging from 920 to 2300 calories. It is the policy of the clinic to prescribe an "average" amount of carbohydrate in diabetic diets. Fifty per cent of the patients were allowed a carbohydrate intake between 120 and 150 gm.; in 25 per cent it was over 150 gm. and in 25 per cent under 120. Only four diets had a carbohydrate intake under 100 gm., and only two were over 200.

Ophthalmoscopic examinations were made on all patients, with particular attention to the presence of lenticular opacities, the state of the vessels, hemorrhage, exudate, atrophy and pigmentation. When retinitis was suspected, an eye consultation was obtained. Clinical evidences of scurvy were sought by examination of the gums. Changes in the gums were thought to be significant if they seeped blood by moderate pressure with a throat stick, or if there was a history of repeated bleeding following the use of a toothbrush. If gums that bled easily were also spongy and hypertrophic, a capillary-resistance test was made by placing the blood-pressure cuff at 30 mm. and inflicting mild trauma in the antecubital space. When boils, open ulcers, carbuncles, incipient gangrene or osteomyelitis was present or had recently occurred, infection was considered significant.

So that adequate controls might be supplied, 50 nondiabetic patients were taken at random from the general medical clinic. No patient on a therapeutic diet was studied. The method of collecting the samples was the same as that for the diabetic patients.

RESULTS

Results of the blood ascorbic acid determinations in diabetic patients and in the controls, and comparisons of levels in various groups are shown in Table 1.

The status of the 100 "old" diabetic patients was found to be considerably better than that of the controls, but was still far below optimal levels. Sixty-three per cent had fasting blood levels below 0.80 mg. per 100 cc., and 35 per cent had levels below 0.40 mg. It was believed that if diet instruction had not been given, the selection of food would have been no different from that of the controls, and that the blood ascorbic acid level would have been in the same low range as in this uninstructed group.

The blood ascorbic acid levels of "new" diabetic patients fell somewhat lower than those of the "old" diabetic patients, but were better than those of the controls. Seventy-six per cent were below

*The recent initiation of the food-stamp plan for Cincinnati relief clients, and the placing of citrous fruits and fresh vegetables on the surplus-commodity list, may considerably simplify the dietary problems of diabetic patients who are on relief.

†The Cebione used in this study was supplied through the courtesy of Merck and Company, Rahway, New Jersey.

0.80 mg. per 100 cc., and 48 per cent were below 0.40 mg. It was again believed that the factor of food selection influenced the results, and that the group as a whole would improve when adequate dietary instruction had been received.

One of the most striking findings in the whole study was the exceedingly low level of blood vitamin C found in the 50 nondiabetic patients. Ninety per cent were below the optimal level of 0.80 mg. per 100 cc., and 68 per cent were under the generally accepted critical level of 0.40 mg. The economic status of the nondiabetic patients was no better than that of the diabetic patients. Left to

to interest the wives of our patients in the lectures on diet instruction.

There was no relation between blood ascorbic acid and age or race of the patients. Thirty-two per cent of the patients were over sixty years of age and showed about the same distribution of values as the whole group. The average for 67 white patients was practically the same as that of 33 colored patients.

Dietary Intake

Diet analysis has proved to be only a fair means of studying vitamin C nutrition. Although the reliability of the patient must be taken into consid-

TABLE 1. *Relation of Blood Ascorbic Acid Levels to Various Groups of Diabetic Patients.*

GROUP OF PATIENTS	TOTAL NO OF CASES	BLOOD ASCORBIC ACID LEVELS					
		UNDER 0.40 MG PER 100 CC		0.40 TO 0.80 MG PER 100 CC		OVER 0.80 MG PER 100 CC	
		No of Cases	Per Cent	No of Cases	Per Cent	No of Cases	Per Cent
"Old" diabetic patients	160	35	35	28	28	37	37
"New" diabetic patients	25	12	48	7	28	6	24
Diabetic patients (all types)	125	37	38	35	28	43	24
Nondiabetic patients	50	34	68	11	22	5	10
"Old" male diabetic patients	38	18	49	8	22	12	29
"Old" female diabetic patients	62	17	28	20	32	25	40
"Old" colored diabetic patients	33	11	33	12	36	10	31
"Old" white diabetic patients	67	24	36	16	24	27	40
Diabetic patients over 60 years of age	32	8	25	13	41	11	34
Diabetic patients with diets under 1200 calories	12	4	33	4	33	4	33
Diabetic patients who have had diabetes for 5 yrs	46	11	24	15	32	20	44
Diabetic patients with poor diabetic control	24	10	42	6	25	8	33
Diabetic patients with good diabetic control	42	13	31	16	38	13	31
Diabetic patients with a blood sugar content over 250 mg per 100 cc	32	13	41	5	16	14	43
Diabetic patients on insulin	56	20	36	15	28	21	36
Diabetic patients with infections	21	6	28	7	32	8	38
Diabetic patients with retinitis	17	6	35	7	41	4	24
Diabetic patients with cataracts	34	7	20	11	32	16	48

their own selection on a limited allowance for diet, they chose cheap foods that happened to have a low vitamin C content. In spite of these low chemical findings, no cases of scurvy were found among the nondiabetic patients.

INFLUENCE OF VARIOUS FACTORS ON BLOOD VITAMIN C LEVELS

Sex, Race and Age

The male diabetic patients had lower levels of blood ascorbic acid than the female patients. Analysis of the diet showed that the former consumed foods low in vitamin C (cooked vegetables and meats), whereas the latter were more inclined to eat foods that supplied a good source (salads, raw vegetables and fruit). Furthermore, the women were more likely to go home and prepare the food about which they had been instructed, but the men had to convey the diet instructions to their wives. In only a few cases have we been able

to interest the wives of our patients in the lectures on diet instruction.

There was no relation between blood ascorbic acid and age or race of the patients. Thirty-two per cent of the patients were over sixty years of age and showed about the same distribution of values as the whole group. The average for 67 white patients was practically the same as that of 33 colored patients.

Dietary Intake

Diet analysis has proved to be only a fair means of studying vitamin C nutrition. Although the reliability of the patient must be taken into consid-

eration, there is also a marked variation in actual vitamin C content of foods as they reach the table. The season of year and the length of time that the food is cooked both alter the amount of available vitamin C. Of the 35 diet analyses made, only two thirds showed a direct relation between the intake of dependable amounts and the blood ascorbic acid. Among the remaining third, 6 patients reported diets with adequate amounts of vitamin C, but showed low blood ascorbic acid levels; 5 showed little or no dependable sources but still had reasonably normal blood levels. No relation at all could be found between *uncertain dietary* sources of vitamin C and the blood level.

If a diet is low in calories, it does not necessarily follow that it is low in vitamin C. Foods of high caloric content, avoided in reduction diets, usually have less vitamin C than foods of low caloric content. Vegetables, fruits and salads high in vitamin C are substituted for bread and fats that have a

lower content. Of 12 patients on reducing diets of 1200 calories or less, one third were found to have blood ascorbic acid levels under 0.40 mg. per 100 cc., and one third had levels over 0.80 mg. This was about the same distribution as that for diabetic patients who were not on reducing diets.

Duration and Severity of the Diabetes

It appears that the longer a patient has diabetes, the higher his ascorbic acid level becomes. Non-diabetic patients had lower ascorbic acid levels than "new" diabetic patients, and "new" patients lower levels than "old" diabetic patients. Forty-four per cent of the patients who had had diabetes for five years or longer were found to have levels of over 0.80 mg. per 100 cc.; only 24 per cent were under 0.40 mg. Seven out of 8 diabetic patients who had blood ascorbic acid levels over 1.30 mg. had been clinic patients for five years or longer. Diet instruction most probably accounts for these findings. The longer a patient has diabetes, the oftener he hears lectures on diet selection, and by dint of repetition, he learns to choose foods that, among other things, are high in vitamin C.

The state of diabetic control and the level of the blood sugar at the time the blood sample was taken had no relation to the blood ascorbic acid, nor did the administration of insulin in any type or amount have any effect on the vitamin C status of the patient.

It has been stated that there is an increased demand for vitamin C during infections,⁶ and that a low vitamin C level of itself tends to delay wound healing.⁷ To find any relation between the two, evidences of either recent or actual infections were sought. No significant relation was discovered; just as many patients in a good state of vitamin C nutrition had pyogenic processes as did those who had chemical scurvy.

Certain Eye Conditions

Bellows⁸ has reported lower vitamin C levels in patients with cataract than in control patients of the same age groups and economic status. Furthermore, he has been able to produce cataracts in guinea pigs by feeding them diets low in vitamin C. The findings in our group of diabetic patients with cataracts failed to support such a contention; 48 per cent had blood vitamin C levels over 0.80 mg. per 100 cc. whereas only 20 per cent had levels below 0.40 mg. Some of the highest levels recorded were found in cataractous patients.

Patients with retinitis, either diabetic or arteriosclerotic, showed a slightly lower ascorbic acid level than the other diabetic patients observed. Among 125 patients, both "old" and "new," 17

cases of retinitis were found. Of these, only 24 per cent had a blood level over 0.40 mg. per 100 cc., compared with 34 per cent for the whole group. Although these findings are lower than the average figures, they are not different enough to be significant.

Bleeding, Infected and Scorbutic Gums

Over half the diabetic patients studied were edentulous. Among the remaining patients, bleeding gums were found oftener in those who had low levels of ascorbic acid. Forty-eight per cent of diabetic patients with ascorbic acid levels under 0.40 mg. per 100 cc., had bleeding gums, whereas only 26 per cent with levels over 0.80 mg. showed this sign. On the other hand, many patients in an excellent state of vitamin C nutrition had gums that bled easily, and normal gums were found in patients whose ascorbic acid levels were close to zero. Low vitamin C was therefore not considered an etiologic factor in the bleeding gums so frequently found in clinic patients.

The incidence of pyorrhea was approximately the same as that for bleeding gums. Although more cases were found among patients with blood ascorbic acid levels below 0.40 mg. per 100 cc., numerous cases were found among those with high levels.

Bleeding, hypertrophic gums suggesting scurvy were found in only 4 cases. One of these had an ascorbic acid level of 1.04 mg. per 100 cc. and showed excellent excretion when given a saturation test. The capillary-resistance test was negative, and since clinically there was only partial evidence, it was believed that the hypertrophic gums were on some basis other than vitamin C deficiency. Two cases had typical scorbutic gums and blood levels of ascorbic acid consistent with the diagnosis, but neither showed any decrease of capillary resistance. They were considered questionable cases of scurvy. The remaining case showed clinical signs of scurvy, and had chemical levels that supported the diagnosis. There was a rather low excretion of ascorbic acid on the saturation test, and a history of not having eaten citrous fruits for four or five months. Out of the 175 cases studied, this was the only one in which the diagnosis of scurvy was made.

CONCLUSIONS

If the clinic patients at the Cincinnati General Hospital are left to their own selection, they choose foods low in vitamin C. The cost of good vitamin C sources, such as citrous and fresh fruits, is higher than that for other carbohydrate sources, and in a clinic composed chiefly of charity pa-

nents, this factor is of considerable importance. An equally significant factor is the natural preference of this class of patients for foods like bread, dry beans and fat meat, in which the vitamin C content is low. It is impossible for these patients to increase food expenditure, but the matter of personal choice can be corrected by diet instruction. Diabetic patients who have come to the clinic regularly and have followed the diet instructions carefully have a more normal ascorbic acid level than new, uninstructed patients.

Although we believe that a normal intake of vitamin C is advantageous, we have discovered no concrete evidence that it has any effect on the state or severity of the diabetes. As many patients with a high level of ascorbic acid were taking insulin as those with a low level. Patients with adequate vitamin C nutrition had glycosuria and hyperglycemia just as frequently as those with inadequate nutrition, and low levels of ascorbic acid had no relation to the incidence of pyogenic processes.

Of considerable interest is the fact that almost half the patients observed had blood ascorbic acid levels under 0.40 mg. per 100 cc., yet only one case presented undisputed evidence of scurvy. One of two things must be at fault. Either there is a deficiency of some substance other than ascorbic acid in clinical scurvy, or we must revise the notion that the critical level for the appearance of scorbutic signs is 0.40 mg. per 100 cc. of ascorbic acid.

SUMMARY

One hundred diabetic patients who had been

under treatment and 25 untreated diabetic patients were studied with respect to vitamin C nutrition. All were clinic patients of low economic status. Two thirds of these patients had a blood ascorbic acid level under 0.80 mg. per 100 cc. Fifty non-diabetic patients were also studied, 90 per cent of whom had ascorbic acid below the prescurvy level (0.80 mg. per 100 cc.).

Dietary inadequacy, caused by lack of money and poor selection of foods, accounts for these low levels of ascorbic acid. The vitamin C status of diabetic patients is improved by diet instruction, even if the food expenditure is as low as \$2.10 a week.

Men were found to have lower than average levels of vitamin C, and patients with cataract had a higher level. Low-calorie diets, insulin administration, hyperglycemia and glycosuria had no apparent relation to blood ascorbic acid content. Only one case of scurvy was found, even though 81 out of 175 patients had blood ascorbic acid levels under 0.40 mg. per 100 cc.

REFERENCES

- 1 Owens, L. D., Reckwern, S. S. and Brown, F. G. An evaluation of vitamin B therapy in diabetes. *Arch. Int. Med.* 66:679-687, 1940.
- 2 Sebesta, V., Smith, R. M., Fernald, A. T. and Marble, A. Vitamin C status of diabetic patients. *New Eng. J. Med.* 220:56-60, 1939.
- 3 Wright, I. S., Lilienfeld, A. and MacLennan, E. Determination of vitamin C saturation 5 hour test after intravenous test dose. *Arch. Int. Med.* 60:264-271, 1937.
- 4 Farmer, C. J. and Abbott, A. F. Determination of reduced ascorbic acid in small amounts of blood. *Proc. Soc. Exper. Biol. & Med.* 34:146-150, 1936.
- 5 Bessey, O. A. Vitamin C methods of assay and dietary sources. *J. A. M. A.* 111:1290-1293, 1938.
- 6 Lauber, H. J., Bersin, T. and Nafziger, H. Der Ascorbinsäurebedarf bei chirurgischen Infektionen. *Klin. Wchnsch.* 16:1274-1276, 1937.
- 7 Aton, H. *Die Nährschäden des Kindes, ihre Entstehung, Verhütung und Heilung*. 152 pp. Berlin and Vienna: Urban & Schwarzenberg, 1923.
- 8 Bellows, J. Biochemistry of lens: some studies on vitamin C and lens. *Arch. Ophth.* 16:58-64, 1936.

POST-MORTEM EXAMINATION IN RURAL GENERAL PRACTICE*

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THIS report covers the results and significance of an attempt to establish as a routine procedure the performance of post-mortem examinations in a rural general practice, and is based on an analysis of the deaths occurring in the four years 1936 through 1939. Of 64 fatal cases, autopsies were performed on 34 (53 per cent); permission for autopsy was refused in 24 (38 per cent) and no permission was requested in 6 (9 per cent).

That the value of routine post-mortem examinations is little understood and appreciated by the lay public is well known. That the medical profession itself shares the apathy, if not the active antagonism, of laymen, must be inferred from the fact that the vast majority of deaths are not investigated by autopsy. In relatively few hospitals is the percentage of post-mortem examinations high enough so that the procedure can truthfully be called routine, and the number of examinations done on the bodies of those who have died outside hospitals is so small as to be negligible from a statistical standpoint.

The arguments that can be adduced for the routine performance of post-mortem examinations in hospitals apply with even greater force to the holding of such examinations in outside practice. Such examinations are the only conclusive means of ascertaining the cause of death, which is a matter of vital interest not only to all who try to draw conclusions from mortality statistics, but also to the family and physician interested in a particular patient. For the physician who has been taking care of a case, it is obviously more than interesting information, since the examination brings into sharp focus in proper relation, often for the first time, all the different stages and aspects of a disease. He is able to review the accuracy of his diagnostic procedures and the appropriateness and effectiveness of his therapy, thus making each fatal case highly instructive and very directly helpful in dealing with future similar cases. Furthermore, the knowledge that an autopsy will probably be held and the case reviewed by a department of pathology strongly encourages conducting a case in such a way that it will stand the light of analysis and discussion by others, and

will be a stimulus to the making of complete records and exact and accurate diagnoses.

The impartial knife of the pathologist is a certain antidote for conceit. Without autopsies, the natural tendency is to develop a blind confidence in one's habitual methods, which tends to be strengthened by the mere passage of time. The physician who is practicing by himself in a more or less isolated community, with no large hospital and few if any colleagues at hand, can more easily and quickly than any other arrive at a point where he feels an unjustifiable degree of self-satisfaction. Most of his diagnoses appear to be correct, or at least nothing occurs to cast serious doubt on them, most of his patients recover following his ministrations, and most of the deaths appear to be inevitable. One who does not take advantage of the opportunities that would be provided by post-mortem examinations on his own cases to recognize and remedy his deficiencies is in danger of ultimately becoming a liability to the community. With unjustified confidence in himself, he is in a position to do a great deal of harm through repetition of unrecognized mistakes.

Such an intensive clinicopathological review of one's cases provides a most effective way for a physician to broaden his knowledge of pathology and medicine. Especially one who is not connected with a teaching hospital has relatively little stimulus or opportunity for study. Only with difficulty and at considerable expense can he pursue definite postgraduate courses. Therefore it is especially important that he make use of such opportunities as are at hand, and certainly routine post-mortem examinations on one's own cases afford the country doctor a unique educational opportunity that is highly profitable and usually available.

This practice would do much to eliminate the double, or really multiple, standard of medical practice that now exists. Fundamentally, there is no reason why patients should not expect and receive just as scientific and satisfactory diagnosis and treatment from the rural general practitioner as from his colleague in the large hospital. They never will while the former continues to bury his mistakes unexamined. Nothing will raise the standard of rural practice of medicine so effectively as routine post-mortem examinations, and

*One of the two essays awarded the Pray and Burnham Prizes for 1940 by the trustees of the New Hampshire Medical Society.

incidentally, nothing will eliminate the bogey of state medicine so effectively as better standards of practice under the present system.

Besides the benefit to the individual physician or the small group that may be concerned with a particular case, each post-mortem examination adds at least a fragment to the general science of pathology, and there is always the possibility of adding something of great importance.

It is, of course, essential in private as in hospital practice to obtain from a responsible relative a valid, written permission for the performance of an autopsy, and obviously this is the first step in doing such examinations. This is easy in many cases, and possible in most if the physician making the request uses a proper approach. He must first have a sincere and strong belief in the value of the procedure, and secondly he must successfully convey to his hearer an appreciation of that point of view. A straightforward, confident approach, conveying the impression that it is routine and to be taken for granted, is all that is usually needed, and disposes at the outset of the argument that autopsies are not customary. The majority of objections encountered are illogical and invalid, and may be overcome by skillfully presenting the case. The commonest of all is the fear of disfiguring the body. This may usually be overcome by drawing an analogy to surgical incisions and pointing out that the exterior of the body is restored to approximately its natural condition so that there is nothing to prevent the usual type of funeral after an autopsy. Many people state that they do not want the body "cut up." A careful choice of words in describing the procedure, in addition to clearly setting forth the arguments in favor of it, will often dispel this prejudice. It is, however, essential to make sure that the person interviewed has an approximately accurate conception of the nature of the procedure, for if permission is granted under the impression that incisions are not involved, the autopsy might result in a most unfortunate misunderstanding. In some cases it is possible to mention the fact that natural decay soon defaces the body, and that an autopsy retards the process, rather than otherwise. One often encounters the attitude that the patient is dead and that the procedure will consequently do him no good. This should be countered by pointing out the opportunity to do good to others suffering from a similar malady, and usually it is possible to say that the patient himself would undoubtedly wish to do what he could to help others similarly afflicted. The possibility of direct and immediate benefit can be brought closely home in cases of possibly hereditary or

contagious disease, or when others in the family are already actually suffering from similar complaints. Occasionally people admit all this, but say that they are not interested. Although the discussion sometimes has to end at that point, it is usually possible, by pointing out in detail the ways in which post-mortem examinations benefit the community, to convince an intelligent person that he should be interested.

There always are at least a few cases in which permission cannot be obtained. An argument difficult to dispose of is the known objection of the patient. If he has previously exacted a definite promise that his body will not be examined, it is usually better to drop the matter. However, under extraordinary circumstances it may sometimes be pointed out that the patient made the request without having an opportunity to discuss the matter or to have explained to him its value under the particular circumstances existing at the time of his death, and occasionally relatives can be persuaded that the patient would probably have changed his mind if he had been in a position to appreciate all the factors involved. About the only other unanswerable argument is the absence of any argument at all. Occasionally one meets the stone-wall type of person who simply says, "I don't want it done," gives no reasons, agrees with all the arguments, and still flatly refuses. It is worth spending time to identify the type, but once it has been identified, further discussion is wasted effort.

It should go without saying that permission should not be bought or obtained by misrepresentation or by threats and intimidations. The harm done by such tactics would in the long run outweigh any possible advantage to be obtained from an individual autopsy.

Although obtaining permission is essentially the same problem in the home and in the hospital, certain circumstances peculiar to deaths occurring at home may make it a little more difficult. Some of these factors are relatively intangible, and are related to the apparently greater aura of authority that surrounds a physician in a hospital, where he seems to the patient and his family much more definitely in control of the situation than he does in the home, where the attitude often enough is that he is merely hired to come in at intervals for the specific purpose of leaving pills. Other more definite factors are related to the fact that a higher proportion of patients dying at home die of seemingly natural and inevitable causes, such as the degenerative changes of old age, which fail to arouse the interest and curiosity of the relatives. Occasionally, oftener in homes than in hospitals, it is impracticable to obtain or even request permission

because of the unavailability of the responsible party or for some similar reason. The responsible relative may have left with others instructions that were intended to cover all contingencies and may not be available for discussion of post-mortem examinations. In some localities it has become customary in chronic illnesses when death has long been expected to call the undertaker before the doctor, or even not to call the latter at all. It is of course illegal for the undertaker to proceed without a death certificate, and this practice

amination, including histologic study, can be made by an experienced physician with a well-equipped laboratory. Nevertheless, there is no reason why any physician could not do for himself autopsies that would be sufficiently complete to be of considerable value, and when the set-up is such that the services of a pathologist are not available, such an effort on the part of the general practitioner would be well worth while.

A number of special factors pertaining to outside autopsies must be borne in mind, regardless

TABLE 1. *Data on Cases on Which Post-Mortem Examinations Were Performed.*

CASE No	AGE	SEX	CLINICAL DIAGNOSIS*	PATHOLOGICAL DIAGNOSIS†
1	67 yr	M	Thyrototoxic heart disease	Thyrototoxic heart disease, perforated empyema of gall bladder
2	82 yr	M	Lobar pneumonia	Lobar pneumonia
3	8 days	M	Prematurity	Prematurity
4	75 yr	M	Coronary occlusion	Coronary occlusion
5	50 yr	M	Carcinoma of bladder	Carcinoma of bladder
6	83 yr	M	Cerebral hemorrhage	Myxedema
7	42 yr	M	Brain tumor	Glioma
8	7 wk	M	Bronchopneumonia	Otitis media, with lateral sinus thrombosis
9	2 days	M	Intracranial hemorrhage (birth injury)	Birth trauma
10	62 yr	F	Coronary occlusion	Pneumonia
11	75 yr	M	Arteriosclerosis (cerebral)	Hypertension
12	75 yr	M	Carcinoma of prostate	Carcinoma of prostate, lymphatic leukemia, diabetes mellitus ()
13	61 yr	M	Hypertensive heart disease	Hypertension, cardiac failure
14	70 yr	M	Cardiac decompensation, pulmonary edema	Aortic stenosis, cardiac decompensation
15	41 yr	M	Coronary occlusion	Ruptured aortic aneurysm
16	69 yr	M	Carcinoma of prostate	Carcinoma of prostate
17	73 yr	F	Hypertension, cerebral accident, bronchopneumonia	Infarct of cerebrum
18	84 yr	M	Dislocation of right knee, bronchopneumonia	Dislocation of knee, bronchopneumonia
19	81 yr	M	Coronary occlusion	Myocardial infarct (hemopericardium)
20	0	M	Birth trauma	Stillbirth, asphyxia
21	92 yr.	F	Carcinoma of colon	Carcinoma of cecum
22	66 yr.	F	Second degree burn, bronchopneumonia	Second degree burn, with infection (toxemia)
23	80 yr.	M	Diabetes mellitus, sepsis	Diabetes mellitus
24	0	F	Stillbirth	Stillbirth
25	67 yr.	F	Chronic arthritis, hyperthyroidism (?), lobar pneumonia	Cardiac failure, lobar pneumonia
26	81 yr.	F	Arteriosclerosis, diabetes mellitus	Diabetes mellitus
27	56 yr.	M	Coronary infarction, cardiac decompensation dietary deficiency	Cardiac hypertrophy, heart failure
28	78 yr	F	Cardiac decompensation, carcinoma of breast, carcinomatosis	Carcinomatosis, pulmonary thrombosis
29	54 yr.	M	Cerebral hemorrhage (right)	Thrombophlebitis, pulmonary embolism
30	86 yr.	M	Senility, pyelonephritis, bronchopneumonia	Cerebral arteriosclerosis, infarct of brain, carcinoma of prostate
31	73 yr.	F	Arteriosclerosis, cerebral hemorrhage, bronchopneumonia	Arteriosclerosis (cerebral), cerebral hemorrhage
32	81 yr.	F	Arteriosclerosis, starvation	Generalized arteriosclerosis
33	71 yr.	M	Cerebral hemorrhage	Fracture of skull (accidental)
34	1 day	M	Intracranial hemorrhage (birth injury), prematurity	Anomalies of heart, incomplete septa

*The diagnoses listed are those that were made in writing at the time of death, previous to the post-mortem examination. For the sake of brevity and to avoid confusion, only those conditions are listed that were assumed to be directly responsible for death.

†The diagnoses listed are expressed so as to give briefly the most significant information derived from the post mortem examination. In most cases the listing consists of the case title assigned to each case by the pathologist on the basis of the anatomic findings.

can be stopped by having a proper understanding with him. Although these factors will probably always operate to keep the percentage of non-hospital post-mortem examinations well below a hundred, it may be seen from this report that it is perfectly feasible to obtain a reasonably high percentage of permissions in a rural general practice.

The ideal arrangement calls for the co-operation of a pathologist or department of pathology of a medical school, in such a way that without expense to the patient a complete post-mortem ex-

of who does the examination. The co-operation of the undertakers serving the territory affected is important; if it is not willingly offered, it should be possible to convince undertakers that it is to their interest to co-operate, and that they are defeating their own aims by attempting to obstruct the performance of post-mortem examinations. In many cases, the undertaker's mortuary provides the most satisfactory place for the procedure, and that is far preferable to having an examination in a patient's home. The latter, however, is perfectly possible, and when necessary it can be done.

without making an undue amount of mess, on an ordinary bed and with but little special equipment. It should be performed expeditiously and quietly, and in such a way that no traces of the procedure remain.

In reviewing 34 cases on which post mortem examinations were done, with a view to discovering just how much practical value there was in doing the examinations, the cases fall into three groups (Table 1). The first, which may be picked out at a glance, includes the cases in which the clinical and pathological diagnoses were obviously different, and in which the autopsy revealed a more or less gross diagnostic error or omission. About 6 cases fall into this group, it would be hard to deny the value of the post mortem examination in such cases. Another 6 fall into the group in which the examination added no significant positive information, whereas the majority constitute an intermediate group, in which the findings were of considerable interest even though not unexpected or dramatic. It must not be inferred from such a classification of the cases that there is any intention of implying that autopsies are important only if they show unexpected findings, even those that reveal nothing that was not previously known are valuable in confirming the clinical findings, in filling in the details of the exact extent of the pathologic changes the nature of which was correctly suspected, and in demonstrating the absence of other findings.

These points will be illustrated by brief comments on typical cases.

CASE 1 This patient was an elderly man who had been operated on for hyperthyroidism. The diagnosis of the underlying condition was clear enough, as is usually true of patients who have undergone operation with pathological examination of operative specimens. However, there were many complications only indirectly related to the thyroid disease, and the examination was most informative with regard to these. The immediate cause of death, peritonitis due to a ruptured gall bladder, was not suspected previous to the autopsy.

CASE 2 The diagnosis of lobar pneumonia in this patient was confirmed, but the affected lobe was not the one expected. This was not of much importance in this particular case but the experience has encouraged more careful physical examinations in subsequent cases.

CASE 6 This patient was not observed before death, and the correct diagnosis, myxedema, might have been made if there had been an opportunity for clinical study. The facts are, however, that it was not remotely suspected on the basis of the available history, and that the implications of an unusual and instructive case would have been lost without an autopsy.

CASE 8 This case brought home with greater force than any other the practical value of post mortem examinations for this infant might not have died if a diagnosis of *Cytis media* had been made and treatment instituted

at the proper time. Without the autopsy the diagnosis would never have been suspected. This naturally has provided a strong incentive to make routine examinations of cadavers.

CASE 10 This case shows another glaring error, lobar pneumonia mistaken for coronary occlusion. The error should not have been made, but whether excusable or not, and whether prognostically important or not, the point here is that without the autopsy it would never have come to light.

CASE 14 There was no question that this man died of cardiac decompensation, but the autopsy provided important information about the anatomic changes in the heart, chiefly aortic stenosis, which it was well worth while to have the opportunity to correlate with the physical findings.

CASE 15 The attack of severe thoracic pain in this case was so suggestive of coronary occlusion that the diagnosis was made more or less unequivocally, but in retrospect, knowing that a ruptured aneurysm was found at autopsy, it seems as though the patient's age (41) and the known history of syphilis were leads that might have been followed up with a more careful examination, which, in turn, might have suggested the correct diagnosis. And of course this case, as well as Case 10, demonstrates the fallacy of making diagnoses of coronary occlusion without electrocardiograms.

CASE 19 This was a straightforward case of coronary occlusion, but the post mortem examination gave the interesting additional information that the terminal event was rupture of the heart, which could hardly have been diagnosed clinically.

CASE 21 The carcinoma of the cecum in this case was diagnosed approximately accurately before death, but it was not possible to be certain that the palpable mass was not some other kind of tumor.

CASE 28 This case was comparable to Case 1 in that the primary cause of death, carcinoma of the breast, was well understood, there were numerous complications, however, and the immediate cause of death, pulmonary embolism, was not suspected during life.

CASE 29 This case gave little opportunity for study before death; however, the patient was seen shortly after the onset of the terminal attack, and long enough before death to permit a reasonably careful examination. On the basis of this the incorrect diagnosis of cerebral hemorrhage was made, and the existence of thrombophlebitis with pulmonary embolism was not suspected.

CASE 30 In this case the incidental finding of unsuspected carcinoma of the prostate, of no clinical importance at the time of death and unrelated to the patient's main difficulties made the autopsy particularly interesting. This lesion would undoubtedly have assumed considerable importance if the patient had lived a number of months longer and this was a point of great interest to the family.

CASE 34 That this neonatal death was due to cardiac anomalies which incidentally, were very unusual and interesting was a considerable satisfaction from an obstetric point of view, for the death would certainly have been credited to birth injury if the autopsy had not been performed.

The cases on which no post mortem examination was made may be divided into groups sim-

ilar to those mentioned above. It may be seen at a glance that some of the diagnoses were vague and uncertain enough to be open to considerable question under any circumstances without an autopsy; in a few cases it was not even possible to make an intelligent guess. There is another small group in which the diagnosis was less doubtful, but still left room for question. In the majority

TABLE 2. *Data on Cases on Which Post-Mortem Examinations Were not Performed.*

CASE No	AGE	SEX	CLINICAL DIAGNOSIS
35	74 yr.	M	Diabetes mellitus
36	75 yr.	F	Hypertensive heart disease
37	45 min.	F	? (neonatal death)
38	97 yr.	F	Pneumonia
39	83 yr.	F	Hypertension, cerebral hemorrhage
40	84 yr.	F	Cerebral thrombosis
41	71 yr.	F	Carcinomatosis
42	76 yr.	M	Lobar pneumonia
43	72 yr.	F	Carcinomatosis
44	77 yr.	F	Cardiac decompensation, hypertension
45	75 yr.	M	Cardiac decompensation
46	82 yr.	M	Senility, arteriosclerosis
47	86 yr.	M	Arteriosclerosis, bronchopneumonia
48	78 yr.	M	Cerebral hemorrhage
49	78 yr.	M	Arteriosclerosis
50	88 yr.	M	Carcinoma of pancreas
51	70 yr.	F	Carcinoma of breast
52	78 yr.	F	Hemorrhage into spinal cord (-)
53	71 yr.	F	Cerebral hemorrhage
54	69 yr.	F	Hyperthyroidism (?)
55	69 yr.	M	Carcinoma of prostate
56	88 yr.	M	Arteriosclerosis
57	89 yr.	F	Arteriosclerosis
58	75 yr.	F	Senility
59	75 yr.	M	Bronchial asthma
60	70 yr.	M	Arteriosclerosis
61	92 yr.	M	Senility, arteriosclerosis
62	75 yr.	F	Carcinoma of ileum, intestinal obstruction
63	76 yr.	M	Arteriosclerosis, diabetes mellitus
64	78 yr.	F	Hypertensive cardiovascular disease

of the cases there seemed little reason for questioning the clinical diagnosis. Again, however, there is no reason for supposing that a post-mortem examination would have been uninteresting or uninformative in even the most seemingly simple and clear-cut of these cases.

These points will be illustrated by brief comments on some of the cases.

CASE 37. This was an apparently normal newborn infant who lived 45 minutes. There was no clue in the mother's pregnancy or labor as to the cause of death, which remains unknown. Obviously an autopsy would have been helpful.

CASE 40. This exemplifies the type of case in which a presumably correct clinical diagnosis can easily be made. However, the clinical course and death attributed to cerebral thrombosis might, of course, have been due to any of a variety of intracranial lesions, and there is no way of knowing what other pathologic processes of importance may have been present.

CASE 41. There was no doubt about the diagnosis in this

case—carcinoma of the breast; the exact extent of the metastatic involvement, however, and the possibility of concomitant lesions remain unknown.

CASE 50. The diagnosis of carcinoma of the head of the pancreas in this case was not much better than a guess, made largely on the basis of severe and increasing jaundice, a palpable gall bladder, and death without other obvious explanation.

CASES 52, 54 and 58. These were all cases that had presented difficult diagnostic problems, none of which had ever been satisfactorily settled, in spite of fairly careful and prolonged study. Refusal to grant permission for autopsy, which would have been essential to obtaining any definite idea of the pathologic conditions present, was particularly disappointing.

It may be seen from the above tabulations and comments that among the cases autopsied there were enough in which the examination revealed important and unexpected findings to justify doing them all on that score alone. And, similarly, among those not autopsied there was a group in which a post-mortem examination was indispensable to the making of a definite diagnosis. But once more I should like to emphasize that important and necessary as autopsies are in making diagnoses in puzzling cases, they are also of great value in confirming and amplifying clinical diagnoses, whereas the most fundamental value of all is in the opportunity for clinicopathologic correlation. In going over these cases, I am convinced that there is no question whatever that the practice of doing fairly routine post-mortem examinations has been of definite and specific value to me, and that I am practicing better medicine today than I should have been able to do if these autopsies had not been done.

In view of these experiences and observations, I believe that some provision for encouraging the performance of autopsies in a truly routine manner, both in and out of hospitals, should occupy an important place in any program that seeks to elevate the standards of medical practice and improve the quality of medical care. In the midst of heated discussion of new methods of distributing and paying for medical care, one must not lose sight of the fact that a more fundamental matter is the quality of that care, and that poor medical care is not worth distributing, by any method or at any price.

The post-mortem examinations on which this report is based were done through the courtesy of the Department of Pathology, Dartmouth Medical School.

MEDICAL PROGRESS

SURGERY OF THE SYMPATHETIC NERVOUS SYSTEM

The Role of Vasospasm in Acute Lesions Involving Major Peripheral Vessels

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A NUMBER of interesting and valuable articles have appeared in recent literature concerning the role of vasospasm in acute lesions of the peripheral vascular tree. Dramatic and vastly improved results have followed timely intervention on sympathetic pathways to the vessels concerned in a number of conditions encountered in everyday practice. These reports concern the management of acute thrombophlebitides and of acute traumatic injuries of the peripheral vessels, such as gunshot wounds and lacerations, emboli and aneurysms.

ACUTE DEEP THROMBOPHLEBITIS

Thrombophlebitis has always been a very troublesome problem, particularly when it involves the large deep veins of the femoral and iliac regions. It may occur after or in association with operations, childbirth or any illness and, although rarely, may even be spontaneous. In its typical form it is sudden in onset, and may be associated with chills and fever. Very prominent manifestations are pain and swelling, the latter extending to the groin or even higher; the circumference of the leg may be increased. The extremity may be pale or cyanotic, and the surface temperature lower in the periphery. There is usually an elevation of the white cell count, and an increased sedimentation rate. Lesser degrees of this lesion are commoner than the typical phlegmasia alba dolens, and are the result of the involvement of smaller and more peripheral veins. This condition is to be differentiated from thrombophlebitis of superficial veins, in which swelling of the entire circumference of the leg is absent. It is also to be distinguished from phlebotrombosis, which, as the name implies, is to be considered the result of thrombosis without infection, fever, swelling, pain or leukocytosis—the usual signs and symptoms of deep thrombophlebitis.

The latter is of immediate interest not only because of the symptoms, but also because of the prolonged convalescence that it has necessitated in the past. Fortunately, death from emboli is rare, in contrast to the mortality resulting from phlebotrombosis. Deep thrombophlebitis also frequently

results in a varying degree of permanent swelling of the leg, which may be both unsightly and disabling. Added to this are difficulties with superficial varicose veins caused by the prolonged but rarely permanent deep venous occlusion. Trouble some ulceration related to destruction of valves in the communicating veins may also be a serious problem in later life. It is therefore of interest that so simple a measure as repeated blocking of the sympathetic nerve supply to the lower extremities with procaine hydrochloride should be followed by such dramatic changes that one may expect many of the immediate and late sequelae of deep thrombophlebitis to be largely eliminated. This form of treatment was first suggested by Leriche.¹ The results of such therapy, as well as its rationale, have been discussed in great detail in a number of communications by Ochsner and DeBakey.²⁻⁴

They picture the pathological physiology in the following manner. The deep venous channel is occluded by the thrombus. This serves as an irritable focus from which afferent impulses pass centrally by way of the perivenous sympathetic plexus, and result in reflex efferent vasomotor impulses to both peripheral arteries and veins. The resulting spasm of peripheral veins causes a marked increase in venous pressure, with augmentation of filtration pressure and relative anoxia of the capillary endothelium, both of which favor increased transudation of vascular fluid into perivascular tissues—in other words, edema. The arterial spasm results in a decrease in the magnitude of peripheral pulsations, which in turn makes for further stagnation of tissue fluids because arterial pulsation is essential to proper lymph flow. In their opinion, neither the mechanical blockage of the vein resulting from the thrombosis nor blockage of the lymphatics due to perivenous inflammation is of primary significance in the production of the clinical manifestations of thrombophlebitis.

To support this theory, Ochsner and DeBakey found that when the femoral vein of a dog was ligated, there resulted a marked diminution in the magnitude of arterial pulsation in the corresponding foot. If a chemical irritant (a 40 per cent

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solution of sodium salicylate) was placed within the lumen or in the perivascular tissue of an isolated segment of this vein, a further decrease in pulse volume resulted. However, interruption of nerve pathways by local infiltration of procaine hydrochloride around the site of the irritated segment or resection of the lumbar sympathetic ganglia and intervening trunk abolished or prevented this effect.

Clinically these authors note that in cases of thrombophlebitis there is also a reduction of peripheral arterial pulsation, and point to the fact that this may be so marked as to simulate arterial embolism. Decreased surface temperature and pallor are further evidences of arteriolar constriction. They found the venous pressure to be four or five times normal in 8 patients.

In the last year they have treated 15 patients with acute deep thrombophlebitis by paravertebral procaine hydrochloride block. In 2 cases, the process was bilateral; thus seventeen extremities were involved, only 1 being an arm. The condition followed operation in 7 cases, delivery in 4, infection in 3, and trauma in 1. Fever ranged from 99.6 to 104.8°F. There was swelling in all but one, with an increase in circumference of the extremity varying up to 9 cm. The length of time between the onset of the process and institution of treatment varied from one to twenty-eight days, and from one to six injections were required.

The following results were obtained. Relief of pain was prompt within half an hour of the first injection in many cases, and after the second or third in all. The fever disappeared in one to eight days—within forty-eight hours in approximately 50 per cent. The swelling completely disappeared in three to twelve days, the majority being relieved in ten. The length of hospital stay ranged from four to twelve days, with the exception of 2 patients, who remained for other reasons. The follow-up period varied from four to twelve months. No recurrence of edema was noted, and no other postphlebotic manifestations appeared.

For the lower extremities, paravertebral novocain block is done in either the lateral or the prone position. Four needles are inserted vertically opposite the upper borders of the upper four lumbar spinous processes, 5 cm. lateral to the mid-line. After making contact with the corresponding transverse processes, the needles are inclined slightly inward and inserted 5 cm. deeper. Five cubic centimeters of 1 per cent procaine hydrochloride is injected through each needle.

To denervate the upper extremity, Ochsner and DeBakey recommend the anterior approach, inserting one needle just above and 1 cm. medial to the center of the upper border of the clavicle, horizontal and at an angle of 45° with the mid-line,

thus contacting the side of the body of the seventh cervical vertebra or the ligament between that and the first dorsal vertebra. Ten cubic centimeters of 1 per cent novocain are injected. Caution must be taken to prove by aspiration that the needle is not in a blood vessel, in the spinal canal or within the pleural cavity. Similar precautions should, of course, be observed when blocking the lumbar trunk.

They believe that the injections should be repeated every forty-eight hours as long as the fever persists. They also emphasize that treatment should be instituted promptly. They prefer repeated novocain block to alcohol injection, since maximal vasodilation follows each injection, whereas if the sympathetic ganglia and chain are destroyed by either surgical removal or alcohol, the maximal response occurs for a short period and cannot be repeated.

Although some might disagree with the dismissal of mechanical blockage of a thrombosed vein or perivenous lymphatic blockage as playing an unimportant role in the production of the manifestations of acute thrombophlebitis, and although others might disagree with the technic of paravertebral novocain block, few would fail to agree that the clinical results of this form of treatment are good. If late perivenous fibrosis and lymphatic obstruction are prevented,—and there seems every reason to believe that they will be,—there should be no recurrence of the edema. It seems possible also that inhibition of venous spasm may shorten the period of complete venous obstruction and may result in a more rapid recanalization of the involved segment. This should lessen the incidence of superficial varices, and of ulceration due to incompetence of communicating veins.

ACUTE LESIONS OF LARGE PERIPHERAL ARTERIES

Acute interference with the main arterial supply to an extremity may result disastrously for the limb and even the patient. This is apter to happen in the leg than in the arm. Survival of the extremity depends to a large extent on the state of the collateral circulation, the nature and location of the lesion, the age of the patient, the presence or absence of organic vascular disease or serious disease elsewhere in the body, and the promptness with which treatment is instituted. Too frequently, however, extremities have had to be sacrificed in spite of all efforts to save them, even when conditions were most favorable. Recent reports emphasize that many of these extremities can be saved if the importance of associated vasospasm is appreciated and promptly eliminated.

Whether the acute arterial deficiency is due to

a gunshot wound, to a traumatic laceration, to an embolus, to surgical ligation of a normal artery, to acute interruption of main-vessel blood flow in the process of obliterating, ligating or excising a peripheral aneurysm, or to spontaneous rupture or thrombosis of the latter, the effect on the collateral circulation, even when adequate beforehand and not the site of organic disease, is extremely important. In all these conditions, the main-vessel flow is effectively blocked, and may be still further occluded by both distal and proximal thrombosis. The only possible source of supply to points distal to the obstruction or site of injury is collateral circulation.

When a large peripheral artery is suddenly occluded, a rather characteristic group of signs and symptoms is noted, commencing with pain and cessation of peripheral pulsation, and followed by various color changes in the skin—usually a mottled combination of pallor and cyanosis. The limb distal to the obstruction becomes anesthetic and cold, and voluntary motion diminishes or disappears. If this condition is allowed to persist for more than a few hours, irreversible changes usually take place, and the extremity becomes gangrenous in a very high percentage of cases.

These changes are undoubtedly similar to those described by Carcassone and Haimovici (De Bakey⁶). The former introduced a balloon into the femoral artery of a dog and found that when the blood flow was quickly and completely obstructed by inflation a characteristic response occurred. This consisted of spasm of the main artery distal to the obstruction, which also affected arterioles and even capillaries. This vasospasm involved the collateral arteries in the neighborhood of the obstruction and at a distance as well. If, however, the occlusion was gradual or incomplete, this diffuse vasospastic response was not initiated.

That intense spasm of the main artery always exists distal to an occluding embolus and presumably involves the collaterals is well known, and has been noted many times at operation. That perivascular trauma may result in intense segmented arterial spasm simulating occlusion is also appreciated.

The importance of this mechanism has been recently discussed in great detail by Gage and Ochsner,⁶ who report a number of successful results following sudden occlusion of major peripheral vessels. They demonstrate that in man as in animals, this diffuse vasospasm can be abolished by excision or temporary destruction (by alcohol) of the sympathetic nerve supply to the extremity. When this is done in conjunction with surgical procedures such as ligation, division or obliteration of the major arteries, the outcome has been uniformly successful even when inadequate col-

lateral circulation was known to have existed previously. The technic for sympathetic block is the same as that described in connection with the treatment of acute deep thrombophlebitis. The needles are left in place for twenty to thirty minutes. When a rise in surface temperature and inhibition of sweating demonstrate the block to be successful, 5 cc. of 95 per cent alcohol is injected through each needle.

Their results are of interest and follow:

We have used the physiologic method, i.e., sympathetic block, of increasing the collateral circulation as a preliminary procedure to the ligation of major peripheral arteries in 10 cases. In all but 2 of these cases the collateral circulation was found to be inadequate by the Matas compressor test. In the other 2 cases, one of which was an aneurysm of the common iliac and the other a stab wound of the common femoral, the test could not be applied. Of these 10 cases, 1 was a mycotic aneurysm of the right common iliac artery. Following sympathetic block and ligation of the common iliac at its origin, there was no change in color and no decrease in temperature of the corresponding extremity. There were 2 cases of arterial aneurysm of the femoral artery and 3 cases of popliteal aneurysm that were cured by obliterative endoarteriomorrhaphy. Three of the cases consisted of arteriovenous aneurysm, 2 of which were femoral and 1 was popliteal. These were treated by quadruple ligation. There was 1 case of stab wound of the common femoral, which required ligation. In none of these cases of ligation of the major peripheral arteries treated by preliminary sympathetic block was there any evidence of ischemia or deficiency of the peripheral circulation. We have also used sympathetic block in 4 cases of embolus of the femoral artery. In 1 case the embolus was removed after sympathetic block. The other 3 cases were not operated upon. In all these cases the classic clinical manifestations of arterial embolism were present. Following novocain block of the lumbar sympathetic ganglia and chain on the affected side, there was a loss of numbness and a return to normal of color and temperature to the extremity. In peripheral arterial embolism there is not only a high incidence of ischemic gangrene but a high mortality, the gangrene increasing the mortality. Therefore, we believe that sympathetic block will not only materially decrease the incidence of ischemic gangrene but will also lower the immediate mortality.

By contrast with the results in similar cases in the past, these are, to say the least, impressive. Ligation of the main vein at the same level as the artery has lowered somewhat the incidence of ischemic gangrene. It was not done in these cases, and the results are far better than one could expect in similar cases treated by simultaneous ligation of major arteries and veins. Peripheral aneurysms have been successfully treated with a rather low incidence of gangrene if operation was deferred until the collateral circulation was found to be adequate. Use of the Matas compressor has been most helpful in this connection. However, when rupture, or thrombosis, or rapid increase in size of the aneurysm had taken

place, forcing surgical intervention before the collateral circulation was adequate, the incidence of gangrene was high. Furthermore, a significant percentage of extremities were lost after removal or obliteration of aneurysms, even if the collateral circulation was known to be adequate beforehand. The saving of four consecutive extremities after embolic occlusion of the common femoral artery without removal of the embolus in three is noteworthy. The incidence of gangrene in the past, whether or not the embolus was removed, has been approximately 70 per cent.

The importance of these results cannot be overemphasized. The sympathetic supply should be interrupted by one method or another either at the time of or before operations that will result in sudden occlusion of major vessels. When spontaneous occlusion has occurred, as from embolism, laceration or thrombosis, the time factor is extremely important. Treatment, with or without embolectomy or other vascular surgery, should be instituted immediately—within an hour or two if possible, certainly within six hours. Every hour lost is important, because if diffuse vascular thrombosis is allowed to take place, the extremity is doomed. Thrombosis is due to stagnation of circulation and damage to the endothelium of the vessel wall resulting from anoxia. After this has occurred, release of vasospasm will no longer be followed by restoration of adequate blood flow.

The question of the best method of interrupting vasomotor pathways to the extremities has been raised by Veal,⁷ who advocates surgical interruption of sympathetic pathways at the time of repair of aneurysms of the extremities. He prefers this to chemical block (by alcohol) because it is more permanent, and better late results are to be expected. He reports 3 cases treated by combined sympathectomy and repair of aneurysms by multiple ligation or endoaneurysmorrhaphy. The arteries involved were the brachial, the femoral and the popliteal. The aneurysm of the latter was spontaneous; the others resulted from a laceration and a gunshot wound. In all, a rapid development of collateral circulation after operation was demonstrated by arteriography.

Alcohol injection appears to be the method of choice in treating patients in shock or the average case of embolic occlusion; the latter is nearly always associated with a serious cardiac lesion, so that the possibility of multiple episodes should be kept in mind.

Denervation of the lower extremity by alcohol injection is less difficult and less dangerous, and is followed by a much lower incidence of peripheral neuritis, than denervation of the upper extremity. Surgical excision of the appropriate portion of the lumbar sympathetic trunk is likewise

easier than the operation necessary to denervate the arm. The technic of these operations has recently been described in detail.⁸

It seems wise to denervate the lower extremity surgically when one is able to choose between the two methods, particularly if a prolonged and permanent effect is desired.

Paravertebral alcohol injection of the sympathetic supply to the upper extremity is difficult to perform and somewhat dangerous, and is followed by a high incidence of brachial and intercostal neuritis. It should be used principally as an emergency technic. Surgical denervation by preganglionic section seems the method of choice in treating other lesions. Much the same opinion about the advantages of surgical excision over alcohol has recently been expressed by Flothow⁹ after years of experience with both methods; he had previously favored alcohol.

Prompt intervention designed to interrupt vasomotor pathways to the extremities by one method or another is indicated in the treatment of acute occlusion of major peripheral vessels. This abolishes vasospasm and will lower the incidence of gangrene, which it has precipitated too frequently in the past.

If extensive thrombosis occurs, gangrene will follow. It seems appropriate to call attention to the use of heparin to prevent thrombosis. Murray¹⁰ recently published a summary of early experiences with this substance, and the indications are that it will prove to be an extremely valuable adjunct in the management of vascular lesions, particularly in reconstructive operations on major arteries after embolectomy, as well as in the treatment of thrombophlebitis. Elimination of vasospasm, combined with intravenous administration of heparin to prevent thrombosis, should go far toward reducing the high incidence of ischemic gangrene following the sudden occlusion of major peripheral arteries.

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REFERENCES

- 1 Leriche, R. Traitement chirurgical des suites éloignées des phlébites et des grands oedèmes non médicaux des membres inférieurs. *Bull et mém Soc nat de chir* 53 187 195, 1927
- 2 Ochsner, A. and DeBakey, M. Thrombophlebitis and phlebothrombosis. *South Surgeon* 8:269 290, 1939
- 3 *Idem*. Thrombophlebitis: the role of vasospasm in the production of the clinical manifestations. *J A M A*. 114:117 124, 1940
- 4 *Idem*. Therapy of phlebothrombosis and thrombophlebitis. *Arch S* 5 40:208 231, 1940
- 5 Jung, A. Review of the 46th French Congress of Surgery. October 4-9 1937, Paris. Translated by DeBakey, M. *Surgery* 3 306 316 1939 P. 314.
- 6 Gage, M. and Ochsner, A. The prevention of ischemic gangrene following surgical operations upon the major peripheral arteries by chemical section of the cervicodorsal and lumbar sympathetics. *Ann Surg*. 112 938 959, 1940
- 7 Veal, J. R. The value of sympathetic interruption following surgical repair of peripheral aneurysms. *M Ann District of Columbia* 9 230, 1940
- 8 Smithwick, R. H. The rationale and technique of sympathectomy for the relief of vascular spasm of the extremities. *New Eng J Med* 222:699 703, 1940
- 9 Flothow, P. G. Vascular lesions of the extremities. *West J Surg* 48:333 340, 1940
- 10 Murray, G. D. W. Heparin in surgical treatment of blood vessel disease. *Arch Surg* 40:307 325, 1940

CASE RECORDS OF THE
MASSACHUSETTS GENERAL HOSPITALANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD G. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27081

PRESENTATION OF CASE

First Admission. A fifty-eight-year-old Italian laborer entered the hospital complaining of progressive enlargement of the abdomen of three weeks' duration.

The patient was seen for the first time four years before admission, when he entered the hospital complaining of sharp, postprandial, epigastric pain relieved by food and alkalis of four months' duration. The day before admission, hematemesis occurred. X-ray studies and gastroscopy revealed a macroscopically benign 1-cm. ulcer on the lesser curvature of the stomach with an associated gastritis; the esophagus appeared normal. In addition the patient was found to have a hypochromic anemia, acute gonorrheal urethritis and a positive blood Hinton test. A Takata-Ara test was positive, and bromsulfalein tests varied from 5 to 30 per cent retention. He was discharged six weeks later on a dietary regime, and at that time x-ray examinations showed a satisfactory reduction in the size of the ulcer.

Second Admission (ten months later). In the interval, the epigastric pain had gradually increased with the onset of anorexia and frequent gastrointestinal upsets; one week before admission the patient had vomited a grossly blood-free material. He had lost 15 pounds. The additional and abnormal findings were as follows: There was tenderness over the entire epigastrium, and the liver was palpable two fingerbreadths below the costal margin. Examination of the heart and lungs was negative, the peripheral arteries were tortuous, and the blood pressure was 180 systolic, 80 diastolic. X-ray films showed slight enlargement of the heart in the region of the left ventricle, with a tortuous aorta and calcification in the aortic knob. The stools were guaiac negative, the blood Hinton test positive; anemia was no longer evident. On the second hospital day, a partial gastrectomy and Polya anastomosis were performed. Pathological examination showed a benign gastric ulcer on the lesser curvature. Post-operative x-ray studies showed a poorly functioning anastomosis, with almost complete retention of the barium; the anastomosis was therefore ex-

ploded ten days later. It was found that the opening through the transverse mesocolon had slipped down over the afferent and efferent loops of the Polya anastomosis, with consequent kinking of the jejunum. This was repaired with satisfactory results, and the patient was discharged six weeks after admission, following an essentially uneventful convalescence.

Final Admission (three years later). In the previous three years the patient had been well except for a slight feeling of weakness; his gastrointestinal symptoms were relieved completely, and he had gained 17 pounds. Three weeks before admission, he noticed a progressive, painless enlargement of his abdomen. Soon this was followed by swelling of the ankles, scrotum and penis, worse in the evening, absent in the morning. Occasionally there was a dull pain in the subcostal region on both sides, and he complained of dyspnea on exertion and a chronic cough with white sputum but no hemoptysis. Although his appetite remained good, it was appeased by two slices of bread and a small amount of vegetables. His urine became scant and dark; there was no change in the character of the stools. No history of alcoholic overindulgence was obtainable.

The past and family histories were irrelevant.

On examination the patient was well developed and well nourished, but in no apparent distress; the skin and scleras were slightly icteric. Examination of the heart showed slight enlargement to the left, with a harsh systolic murmur over the precordium, heard maximally at the apex. Examination of the chest revealed dullness to percussion, diminished tactile fremitus and voice sounds over the right back below the eighth rib, up to the third rib in the axilla and below this level anteriorly. The abdomen was markedly distended, dome shaped, tense and tympanitic to the flanks; shifting dullness was present. Liver dullness was present to a point 5 cm. below the costal margin. There was pitting edema of the legs, sacrum, scrotum and penis. Rectal examination was negative. Examination of the nervous system was negative.

The temperature was 101°F., the pulse 85, and the respirations 20.

Examination of the urine showed a ++ test for albumin and a + to ++ test for bile; the urobilinogen was positive up to a dilution of 1:80. Examination of the blood showed a red-cell count of 4,000,000 with a hemoglobin of 75 per cent, and a white-cell count of 8400 with 73 per cent polymorphonuclears. The serum van den Bergh was 4.5 mg. per 100 cc., biphasic, a bromsulfalein test showed 55 per cent retention, and a formol-gel

test was positive. The nonprotein nitrogen of the blood serum was 22 mg. per 100 cc., the total protein 6.97 gm., with 2.28 gm. albumin and 4.69 gm. globulin (ratio 0.49). The prothrombin time was normal; a hematocrit reading was 42.1 per cent. Blood Hinton and Wassermann reactions were positive. The sputum was essentially negative, and no tubercle bacilli could be found in a smear. Examination of the stools was negative.

X-ray films of the chest showed the diaphragm to be unusually high, with atelectasis at the right base. There was a diffuse mottled density involving the greater portion of the left upper lobe, with a suggestion of a cavity overlying the first rib. The heart was normal, the aorta calcified. There were no enlarged lymph nodes, and no metastases were seen in the bones.

A gastrointestinal series showed a wide esophagus with extensive curling (adhesions), but definite varices could not be demonstrated. The abdomen was huge and dense. The lower two thirds of the stomach had been resected, and there was good function of the anastomosis and no evidence of disease in the stomach. Marked degenerative changes were present in the lumbar spine. There was no evidence of splenic enlargement.

The patient was placed on a high-calorie, high-vitamin diet and intravenous 25 per cent glucose, and an attempt was made to improve kidney excretion. An abdominal paracentesis yielded 3500 cc. of clear straw-colored fluid with a specific gravity of 1.012; this procedure was repeated on the fifth hospital day, when 5000 cc. of fluid was obtained. The serum van den Bergh was then 5.5 mg. per 100 cc., the white-cell count 11,200. Fluid gradually accumulated at the lung bases, especially on the left, and the patient became drowsy and coughed a great deal. An x-ray film of the chest three weeks after admission showed a homogeneous density on the left side, with an increased, more localized density in the infraclavicular area. This localized area had markedly increased since the previous examination. The right side was unchanged. The sputum grew a few colonies of beta hemolytic streptococci, and a blood culture was negative; the temperature was 102°F., and the white-cell count 19,000. Finally, fluid became still more pronounced at the lung bases, but the ascites seemed to diminish. The patient's breathing became labored, his color was ashen and icteric, and edema of the hands developed. Death occurred one month after admission. Throughout hospitalization, the temperature spiked to 102°F., gradually tending to remain elevated until the last four days, when it dropped below normal.

DIFFERENTIAL DIAGNOSIS

DR. THOMAS V. URMY: May we see the x-ray films?

DR. AUBREY O. HAMPTON: On first inspection of these films, I am inclined to disagree with the report. The esophagus does not look normal to me. I should hesitate to rule out varices. True, the patient had curling or adhesions to confuse the picture. I should certainly suspect that he had varices.

DR. URMY: Am I correct in believing that the X-ray Department attaches no significance to curling?

DR. HAMPTON: It does not mean anything. It just makes the examination more difficult in a case in which one suspects varices.

I suppose you are most interested in the chest. The films were taken twenty-one days apart. I do not believe that the heart is enlarged. The aorta shows calcification without dilatation. There was extreme arteriosclerosis.

DR. URMY: Is the dome of the diaphragm nodular or irregular?

DR. HAMPTON: You cannot see it quite well enough to be sure, but I do not believe it is either nodular or irregular. The liver does not look large.

I do not know what this is in the left upper lobe. There is rapidly progressive consolidation, and it appears that there are cavities without a shift in the mediastinum. It does not look like tuberculosis, but rather like some acute infection. At this time the patient had pleural disease also, and there is probably a diffuse effusion over the left lung.

DR. URMY: The cavities have increased tremendously.

DR. HAMPTON: Yes, unless they tapped his chest. The cavities in his chest look more like those due to gangrene than those produced by abscess or tuberculosis.

DR. URMY: For the sake of simplicity I think we can eliminate a certain amount of the history. The first four years seem mainly concerned with a condition that does not play any part in the final admission. The patient first came in with a hematemesis and a story consistent with ulcer. Although such a lesion was demonstrated both by x-ray examination and gastroscopy, there was also some gastritis, which might have been the source of the bleeding. In addition there was a suggestion of liver disease because of a positive Takata-Ara test and a sometimes abnormal bromsulfalein test. However, the correctness of the diagnosis of ulcer as the source of the hemorrhage and the cause of the symptoms seems to have been

borne out by the subsequent course, since the gastric resection apparently relieved all symptoms, except for slight weakness, for a period of three years. In the light of the final admission, we are mainly interested in the early suggestion of hepatic disease. The liver was probably not enlarged at the early admission. I also view as significant the statement that the patient remained weak during the three years between his second and third admissions; this is consistent with chronic hepatic disease. At the first admission a probable diagnosis of syphilis was also made. The positive Hinton test was confirmed at the third admission.

When we reach the final admission, we should like to know more about the patient's syphilis, especially whether he had had treatment during the interval and, if so, what sort of drugs had been used, because as we go along we wonder whether arsenic poisoning might have entered the picture. We also wonder whether the patient had had sufficient treatment to eliminate active syphilitic disease of the liver.

On the third admission the patient showed ascites and edema. The ascites had come first, which is suggestive of portal obstruction in addition to a more generalized cause of edema. Therefore in view of the knowledge of probable liver disease it seems logical to try first to connect the ascites and edema with a diseased liver. Liver disease is borne out by various observations at the last admission. The patient was icteric. The size of the liver was uncertain. On physical examination it was found enlarged to percussion, but this finding is of dubious value because the abdomen was markedly distended. The liver edge was evidently not actually felt, nor do we know whether it was palpated later after abdominal tap. The x-ray plates seem to refute the suggestion that there was enlargement. The spleen also was not enlarged, according to the x-ray films. Various laboratory tests pointed to hepatic disease. The increased urobilinogen in the urine could be due to increased blood destruction, but with a biphasic van den Bergh, not an indirect reaction, I think we can assume the cause to be impaired hepatic function. The albumin-globulin ratio was quite striking. A marked drop in albumin with a rise in globulin is consistent with hepatic disease; in fact, in the absence of appreciable loss of albumin in the urine, it is very strong evidence of severe liver damage. The bromsulfalein, as well as the formol-gel, test is also confirmatory.

We might consider cardiac edema because the patient complained of dyspnea and is reported to have had a loud cardiac murmur that was not noted at the first admission. He also had cough.

On the other hand, the heart was probably not enlarged, and the murmur not typical enough to permit a diagnosis of valvular disease. The lack of enlargement alone is enough to make one think that the heart was not impaired. In addition, heart disease could not, of course, explain all the physical and laboratory findings. I should not seriously consider either nephrosis or nephritis as the cause of the edema. We might mention infection in the peritoneum as a possible cause of the ascites, but it would not explain much more of the clinical picture. When the abdomen was tapped, the fluid had a specific gravity of 1.012, which is certainly on the transudate side, although a little higher than most transudates. There is no mention of cellular elements. However, I think we can be sure that the fluid was a transudate and not an exudate.

Another important part of the picture is the pulmonary disease, which Dr. Hampton has not been able to classify, and which I am quite certain I cannot. According to the history, the patient had had a chronic cough. On the other hand, x-ray studies within three years had not shown any pulmonary disease. We can say that the condition was progressive and probably of rather recent origin. Tuberculosis is not ruled out by one sputum examination. We can think of pneumonia, and perhaps that is the most tenable diagnosis, in spite of the fact that no pneumococci were found in the sputum. That is as far as I can go. There was infection in the lung, and there was also pleural fluid, which I should judge to have been part of the general fluid disturbance, although it is curious that the collection was on the left side instead of the right, where we should expect it to have been more marked.

The patient ran a higher temperature than most people with cirrhosis do, even in the terminal stage. The chest condition was, I think, the major cause of the fever. This assumption is borne out by the white-cell count, which rose instead of declining, as it does in liver failure. Furthermore, I think we can assume that the rapid progress of hepatic insufficiency was accelerated by the chest infection and that the patient's death was due not exclusively to liver failure but also to general toxemia from infection. Another possible explanation of the increased fever is cancer; and cancer does, of course, sometimes develop in a previously cirrhotic liver. One other explanation of the higher fever than that usually seen in cirrhosis is gumma of the liver. We might seriously consider gumma if we knew that the patient had not had treatment for syphilis.

In many cases of portal cirrhosis we find posi-

tive blood Hinton tests and wonder how much of a part syphilis is playing. At the postmortem, scarring typical of syphilitic cirrhosis is not found as a rule. I think, therefore, that on the law of averages this case will show a nonsyphilitic cirrhosis. The history of alcohol is a bit difficult to interpret. The history taker believed that the patient had not overindulged in alcohol, but does not tell how much he consumed. However, the patient was an Italian, and we have seen Italians in this hospital with portal cirrhosis who have only drunk wine. It is possible to interpret the statement in the history to the effect that he had been a wine drinker, but not a drinker of hard liquor. Antisyphilitic treatment—arsenic—I have mentioned as a possible factor in precipitating hepatic failure.

In summary, then, I think that the patient had a portal cirrhosis of the liver; he had had signs of the disease for at least four years before the final admission, but his liver had functioned fairly well until a short time before the last admission. His very rapidly downhill course at the end was, I believe, due to a new factor in the picture: a fairly acute pulmonary infection, apparently nontuberculous. He evidently also had syphilis, which may have played a part in producing the liver disease. There was, in addition, hypertension of a mild degree, but probably no important cardiac lesion. I do not believe that the previous ulcer and resection played any part in the final picture.

CLINICAL DIAGNOSES

Cirrhosis of liver, toxic.
Varices of esophagus?
Tuberculosis of lung, left upper lobe?
Bronchopneumonia, terminal.
Hydrothorax, left.

DR. URMY'S DIAGNOSES

Portal cirrhosis of the liver.
Syphilis.
Hypertension.
Pneumonia?

ANATOMIC DIAGNOSES

Alcoholic cirrhosis of liver.
Esophageal varices.
Jaundice.
Ascites.
Peripheral edema.
Pulmonary tuberculosis, with cavitation (left upper lobe).
Empyema, left.
Syphilitic aortitis.

Operative wounds: Polya resection of stomach, old; paracentesis, old and recent; peritoneoscopic incision, recent.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: The post-mortem examination showed, as Dr. Urmey predicted, that the chief cause of death was cirrhosis of the liver. The liver was fairly small, weighed only a little over 1000 gm., and was definitely atrophic, very finely and diffusely granular and extremely tough when one attempted to cut it. On microscopic examination it showed hyaline degeneration, which we ordinarily associate with alcoholic cirrhosis and with alcoholic cirrhosis produced by drinking something stronger than Italian red wine. The Italian patients, as we see them in this hospital, show a disproportionately high incidence of cirrhosis, but do not show this very finely granular type of liver and do not show hyaline degeneration. This liver would have passed for an Irishman's. There were esophageal varices; they were not large, however. The spleen was quite small, weighing only 250 gm. The left pleural cavity contained over 2 liters of cloudy fluid, and the left lung showed numerous cavities surrounded by miliary tubercles and areas of caseous pneumonia. The patient did have morphologic evidence of syphilis. The ascending aorta was definitely dilated, showed atheroma greater than that of the descending aorta, a good deal of longitudinal wrinkling and a few stellate scars. The sinuses of Valsalva were markedly dilated, and they were so capacious that one could very easily have put a large marble into each sinus. The mouths of the coronary arteries were constricted.

DR. HAMPTON: Do you think that syphilis had anything to do with the extensive calcification in the aorta?

DR. MALLORY: It may have. I think there is no question that syphilis of the aorta predisposes to particularly severe atheroma of the segment involved by the syphilis. There was very slight separation of one of the aortic commissures, but not enough to produce free regurgitation.

CASE 27082

PRESENTATION OF CASE

A sixty-nine-year-old woman entered the hospital complaining of upper abdominal pain.

For years the patient had been troubled with indigestion and a feeling of heaviness in the left upper quadrant of her abdomen, associated with gaseous eructations and belching of sour, burn-

ing material, soda relieved these symptoms. For the previous month she had noticed a "dark-brown" taste in her mouth each morning, and on one occasion three weeks before admission she thought that her skin was yellow. After a meal, six days before admission, the patient was seized with a severe aching pain in the epigastric and periumbilical regions. Nausea and vomiting soon followed, and although the pain became steadily worse, it was relieved to some extent by lying down; the vomitus was dark brown and bitter. She remained in bed until the time of admission; pain was present most of the time, but fluctuated in its severity. Vomiting continued, and her abdomen became slightly distended.

The patient had been in the habit of taking salt laxatives two or three times a week for some time. During the month before entry she had found it necessary to increase the dosage, and the day before and again on the day after the onset of abdominal pain she took still larger doses. Evacuation was copious on both occasions. However, she had had no bowel movements during the four days before admission and had eaten nothing. Furthermore, the patient stated that she had always consumed large quantities of water, and that for the previous six months she had urinated on an average of three times during the night and four times during the day.

The patient had had diphtheria and the usual childhood diseases. Ten years before admission she had had a radical mastectomy for cancer, and seven years before entry an appendectomy, followed shortly afterward by the repair of an incisional hernia. Five sisters and three brothers were said to have died of either tuberculosis or "inflammation of the bowel."

On examination the patient was well developed, obese and apparently ill. A healed mastectomy incision was present in the right chest. Examination of the heart was negative, the blood pressure was 150 systolic, 100 diastolic. Fine crackling rales were heard at the left lung base. The abdomen was distended and tympanitic, with generalized tenderness, high pitched peristaltic sounds were heard best over the umbilicus. The reflexes were normal.

The temperature was normal, the pulse 110, and the respirations 22.

Examination of the urine showed a ++ test for albumin and +++ test for sugar. Examination of the blood showed a red cell count of 5,890,000 with a hemoglobin of 18.9 gm (photoelectric cell technic), and a white-cell count of 13,600, of which 84 per cent were polymorphonuclears. The non-protein nitrogen of the blood serum was 35 mg

per 100 cc, the chlorides 100.1 milliequiv per liter, and the blood sugar 294 mg per 100 cc. A blood Hinton test was negative. The stools were brown and guaiac negative on two examinations, the vomitus was also guaiac negative.

A plain x-ray film of the abdomen showed a number of gas filled, slightly dilated loops of small intestine. The one in the mid abdomen appeared to be ileum, the others suggested jejunum. There was a small quantity of gas in the stomach, but none was seen in the colon.

Attempts to insert a Miller-Abbott tube resulted in failure, for it would not pass the pylorus. Very little drained from the stomach, and abdominal distention and tenderness increased. The patient was given insulin and glucose, the fasting blood sugar ranging between 180 and 295 mg per 100 cc. An x-ray film of the abdomen two days after admission showed that the loops of small bowel formed a stepladder pattern in the left side of the abdomen, the Miller-Abbott tube still lay in the stomach. The next day, moisture developed in the right lung base, without signs of consolidation, the white cell count was 10,400, the temperature 99.7°F, the pulse 100. On the sixth hospital day an exploratory laparotomy was performed under spinal anesthesia through an old midline hernia repair scar. There were no omental adhesions at the site of the previous operation, and no free fluid. Uniformly dilated small bowel could be observed down to the region of the ileocecal valve, and no areas of collapsed bowel were found. The cecum was pulled into the right upper quadrant by an omental attachment, which was firm and sclerotic, and beyond this it was obviously edematous, as the result of a recent inflammatory process; this was freed up. The cecum was markedly dilated, as was the transverse colon to the splenic flexure, the descending colon was approximately one fourth the diameter of the transverse colon. Nothing suggestive of cancer could be found in the region of the splenic flexure. The balance of the colon down to the rectum was explored, but nothing could be found to explain the patient's symptoms. There were no areas of fat necrosis, and although there was some scarring of the undersurface of the liver and around the duodenal cap, no mass could be outlined in the gall bladder or head of the pancreas. No explanation could be offered for the failure of the Miller-Abbott tube to pass into the pylorus. The pelvis and its organs appeared normal. Because of the symptoms of intestinal obstruction, the dilated cecum and the uniformly dilated bowel down to the ileocecal valve, a cecostomy was performed through a McBurney incision.

DIFFERENTIAL DIAGNOSIS

DR. CLAUDE E. WELCH: This is a case in which I believe it is important to review the past history to look for leads that might explain the events to follow. The pains in the left upper quadrant of the abdomen and the gas and belching, relieved by soda, both point to either the stomach—possibly an ulcer, possibly gastritis, possibly diaphragmatic hernia—or the gall bladder. The “dark-brown” taste means nothing to me. The fact that she thought her skin was yellow may or may not be of significance. If it were accepted as true, it would give some indication that the biliary system was at fault.

From the history, there are two or three other organs that we can identify as possible causes of trouble. From the story of increasing constipation, of course, we wonder immediately about the colon. Then the suggestion of diabetes brings the pancreas into mind. With an operation for carcinoma of the breast and an appendectomy followed by adhesions, we have two other causes for intra-abdominal difficulty.

Her present illness of six days' duration is important in two respects. The pain began in the epigastric region and was followed very shortly by nausea and vomiting, and I should infer from the history that the vomiting was almost continuous from that time and that the pain remained in the same location. That will be very important when we discuss the site of her difficulty a little later.

The physical examination gave evidence of ileus of some type, almost certainly dynamic, in view of the high-pitched peristaltic sounds. The white-cell count is of a great deal of interest, because that, combined with a normal temperature, more or less eliminates an inflammatory lesion and makes us think much more of mechanical obstruction. The blood chemical findings are not abnormal except for the evidence of diabetes.

The only thing not mentioned on physical examination is the rectal examination, which I assume we may regard as negative.

DR. AUBREY O. HAMPTON: This patient had almost daily x-ray examinations, beginning on the third of the month and extending to the seventh. During that time she had dilated loops of small bowel that varied somewhat in size, and occasionally gas was visible in the colon. The frequent examinations were directed mostly at determining the progress of the Miller-Abbott tube. The tube would not go through the pyloric valve, no matter what we did. Multiple fluoroscopies and all sorts of manipulations were of no value. Finally she was given some barium to see why the tip of the

tube would not go through the pylorus. Only a swallow was given, and we found a definite abnormality in the duodenum. This is the tip of the tube. This is the cap, and this is a hooklike projection at the beginning of the second portion of the duodenum, a very queer-looking deformity. Then we looked back over our films and found some gas shadows above their usual position, high up in the region of the liver, rather linear-looking shadows.

DR. WELCH: Was gas in the colon prominent in the early examinations?

DR. HAMPTON: No; in the beginning we saw very little gas in the colon, and it was only some time later that we found it. She had a period of improvement, and at that time the gas passed into the colon.

DR. WELCH: Dr. Hampton has been extremely helpful, for a change, I should say. The failure of the Miller-Abbott tube to pass the pylorus usually does not mean anything at all. It may fail when the patient is perfectly normal. We have had several cases in which it refused to pass owing to an inflammatory lesion in the pylorus or just beyond it in the region of the duodenum, ascending colon or gall bladder. With the x-ray findings that Dr. Hampton has pointed out, one must, of course, pay a good deal of attention to the possibility that there was an inflammatory lesion just beyond the pylorus.

Obviously the patient was not improving, and for relief of obstruction it was consequently necessary to do an exploratory laparotomy. I wonder what the surgeon's preoperative diagnosis was. I should imagine that he probably considered adhesions as the probable source of the difficulty, because of the previous abdominal operation. The extreme completeness of the operative note is quite remarkable in view of the fact that the patient must have had dilated loops of small bowel making the exploration difficult. “Uniformly dilated small bowel could be observed down to the region of the ileocecal valve, and no areas of collapsed bowel were found.” That is *prima facie* evidence that the obstruction was lower than that. One would imagine that the “inflammatory process” was the same thing that Dr. Hampton pointed out in relation to the second portion of the duodenum. “There were no areas of fat necrosis, and although there was some scarring of the undersurface of the liver and around the duodenal cap, no mass could be outlined in the gall bladder or head of the pancreas.” In other words the operative findings in that site were not so remarkable as the x-ray findings.

This operative note makes the record more or less like an Agatha Christie story. Every organ

was explored and found to be normal, and yet we know one was not normal. In the first place, I think we might as well rule out unusual causes of ileus, such as metastatic carcinoma of the breast involving the spinal cord and producing a paralytic ileus. The story is not suggestive of that. Some renal lesions would produce paralytic ileus, but again that is unlikely, because this is a story of dynamic rather than paralytic ileus. We are therefore left with some lesion that must be intrinsic in the bowel itself, or pressing from the outside in such a fashion as to occlude it.

Our next problem is to localize the obstruction in the large bowel or small bowel. Obviously the operator believed he was dealing with a lesion in the splenic flexure, although it was impossible to feel it, a likely supposition because it is almost impossible to feel carcinoma obstructing the splenic flexure. There are a few features against large-bowel obstruction, however. In the first place, the pain was in the epigastrium when it began. It was followed immediately by vomiting, and the vomiting persisted for a period of six days. That is a very unusual story for acute large-bowel obstruction, in which vomiting may initially occur, but then is absent for a period of days. Finally the small bowel became loaded with fecal matter, and fecal vomiting finally occurred. In other words, from the story the obstruction was high in the small bowel. The guaiac negative stools are also of interest, and the x-ray picture shows absence of gas in the colon in the early stages of the disease, when the patient obviously had obstruction of the small bowel. In favor of large-bowel obstruction is the fact that the cecum and transverse colon were dilated, as well as the splenic flexure. That brings up the problem, then, of what it would be possible to overlook in the abdomen, so far as the intestinal tract is concerned, at the time of operation. Assuming the patient had a large bowel lesion, what would be overlooked? Most likely a carcinoma of the splenic flexure, possibly volvulus, especially of the cecum. That is ruled out, since the cecum was bound down by adhesions. Furthermore, volvulus of the sigmoid is ruled out by the fact that there was no distention of the descending colon. In other words, the only thing that could be overlooked in the large bowel, I believe, is carcinoma of the splenic flexure.

Could anything be overlooked in the small bowel? The operative note says the small bowel was observed down to the region of the ileocecal valve, and no areas of collapsed bowel were found. This does not exclude obstruction of the small bowel. I think probably all of us have seen, for

example, distention of the rectum beyond the obstructing lesion, and occasionally we have observed the same thing in the small bowel following inflammatory adhesions. There is distention not only proximal but distal to the point of obstruction after the disease has gone on for a certain length of time. I am inclined to believe that is so in this case, and I am also led to think that the small bowel was not observed inch by inch from the ileocecal valve to the ligament of Treitz. It seems to me that is the likeliest site for some thing to be overlooked.

What lesions in the small bowel could be overlooked? The patient obviously had no strangulating obstruction with volvulus and no intussusception, because she had no free fluid in the abdomen. Could there be some internal hernia that was not observed? That is entirely possible. Could she have had a tumor of the small bowel that was not observed, probably one of the benign type, such as carcinoid? Again, that is a possibility. Could she have had a foreign body obstructing the small bowel? If there were a foreign body, the commonest would be a gallstone. Dr. Hampton has kindly pointed out a lesion involving the biliary tree. The gas in the liver is very suggestive of a fistula between some part of the biliary tree and the duodenum, the prerequisite for a gallstone ileus. There are a number of features here that would go with the diagnosis of gallstone obstruction, such as the long story, the yellow skin, and the fact that there was definite obstruction of the small bowel; I shall therefore make that my diagnosis. The diagnosis is intestinal obstruction; this was probably due to a gallstone, and my second bet, which I believe is less likely, is a carcinoma of the splenic flexure.

CLINICAL DIAGNOSIS

Intestinal obstruction

DR. WELCH'S DIAGNOSIS

Intestinal obstruction, due to gallstone, or to carcinoma of the splenic flexure.

ANATOMICAL DIAGNOSIS

Intestinal obstruction, due to gallstone.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: To leave room for discussion, we had to stop this case at the point of the exploratory operation. As soon as the patient had convalesced sufficiently and the obstructive symptoms had disappeared, further investigation was done, which Dr. Hampton will show.

DR. HAMPTON: We subsequently outlined the

biliary tree with barium, but I thought that would make it too easy. I held out on you a little. The barium entered the common duct and gall bladder. We made the diagnosis, as Dr. Welch has, of perforation of the gall bladder into the duodenum, and gallstone ileus. The surgeon went in to remove the stone but could not find it. He did examine the small bowel thoroughly, even though the patient was an enormously fat person. Then he thought it must be in the colon at the splenic flexure, because that is where the obstruction was at the time of operation. We demonstrated a non-opaque stone by barium enema in the sigmoid after the operation.

DR. MALLORY: The day after the last x-ray plates were taken, the surgeon performed the final operation—a digital removal of the stone, which had finally reached the rectum.

DR. WELCH: What was the size of the stone?

DR. MALLORY: About 4 by 2.5 cm.—a very large one. It might easily have been permanently

stuck at the ileocecal valve. These patients with gallstone ileus, of course, invariably have a fistulous connection between the gall bladder and the duodenum. The stones are too large to pass through the cystic duct, and it is only by the formation of adhesions between the gall bladder and the duodenum, and perforation between the two viscera, that the stones make their way into the small bowel.

DR. HENRY H. FAXON: Is there anything in the history to suggest that the stone had been passed down?

DR. MALLORY: They did not get it very clearly. Certainly the initial part of the story is typical of small-bowel obstruction, and I do not believe that they were able to make a definite transition to large-bowel disease from the symptoms.

DR. HAMPTON: The surgeon did say the patient was getting better, but with a positive diagnosis of gallstone ileus he thought it advisable to attempt removal of the stone.

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of
THE MASSACHUSETTS MEDICAL SOCIETY
and
THE NEW HAMPSHIRE MEDICAL SOCIETY

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SUBSCRIPTION PRICES: \$6.00 per year in advance, postage paid for the United States; Canada \$7.04 per year; Boston funds (including war exchange tax) \$8.52 per year for all foreign countries belonging to the Postal Union.

MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

NATIONAL DEFENSE WEEK

For the past nineteen years, the period from Lincoln's Birthday to Washington's Birthday has been set aside as "National Defense Week." This period has been devoted to acquainting the public with the state and needs of our national defense, and was initiated, sponsored and carried on under the auspices of the Reserve Officers Association of the United States.

Largely owing to the activities of this organization, the public and Congress have been made aware of the need for an adequate Officers Reserve Corps and have been persuaded to appropriate funds for the training of this corps. Funds for this activity, as for all defense activities, were made available in a niggardly fashion until 1936,

when a somewhat more generous policy made it possible to initiate large-scale army maneuvers.

Throughout its history, this association has had an almost unique record of working wholeheartedly and unselfishly for national defense, with particular stress, of course, on the civilian components of the United States Army. In the development of the Officers Reserve Corps, the medical profession has taken a part of which we should all be proud. The first reserve officers in our army were a small band, numbering less than 300, organized in 1916 as the Medical Reserve Corps. This was the parent of the Officers Reserve Corps, which now has more than 100,000 officers of all arms and services on its rolls, including 15,000 medical officers.

In the activity of the association, doctors everywhere have given generously of their time and, indeed, have in many ways been the backbone of the entire movement. They have made possible the physical examination and immunization of officers throughout the last twenty years. They have spent time in the study of medical tactics—an activity that concerns approximately half the medical officers of any armed force. In Metropolitan Boston, as in other cities, a large medical chapter of the association has provided a nucleus for activities and training of the Medical Department, and two doctors have been presidents of the Massachusetts department of the association.

By July 1, it is expected that our expanded army will have about 9000 medical officers serving for "a year's training." Of these, about two thirds will come from the ranks of the Officers Reserve Corps and will be, for the most part, men who have qualified for their positions by activities outside their professional duties. It seems desirable, at this time, to call attention to the devoted work of those men who are sacrificing a year of their time to occupy important tactical and administrative positions in the Medical Department of our expanded army, so that adequate training may be provided for the younger medical officers and for the selectees assigned to the Medical Department as enlisted personnel. The sacrifice for those who have attained field-officer rank in the

Officers Reserve Corps is even greater, and they have already proved their value in the national-defense program by their current activities. It is to be hoped that their successors, who are now getting their first taste of army training, will grow to appreciate the public service that this group has rendered and is rendering, and will carry on so that the Medical Department will be properly manned not only professionally but in regard to the administrative and tactical framework that is necessary for bringing medical service to the sick and wounded.

WAR MEDICINE

THE appearance in late January of the first issue of a bimonthly publication, *War Medicine*, represents a response on the part of the Division of Medical Sciences of the National Research Council and of the trustees of the American Medical Association to a demand for information concerning the medical problems brought about by the present emergency.

During the spring of 1940, at the instigation of the Surgeons General of the United States Army and Navy, the Division of Medical Sciences of the National Research Council created a number of committees, composed of outstanding physicians, to advise in regard to what should be adopted as routine procedures in particular branches of medicine. As pointed out in an article in the current issue of *War Medicine*, there are, at the moment, six committees, covering medicine, surgery, aviation medicine, transfusions, chemotherapeutic and other agents, and neuropsychiatry, with subcommittees for the more detailed specialties of medical practice and research, especially as they relate to the broader aspects of military medicine.

A seventh committee, the Committee on Information, was created for the purpose of making available to the governmental services in particular and to the medical profession in general the recommendations of the advisory committees and pertinent information gleaned from all sources. In addition to various monographs, manuals and bulletins, this committee suggested the publication of a periodical devoted wholly to medical prepared-

ness and war medicine, an undertaking to which the trustees of the American Medical Association generously agreed. *War Medicine* is the result, with the members of the Committee on Information constituting the editorial board.

Since many of the medical problems of preparedness and war have little to do with those of civilian practice, this journal should prove to be of great value to all physicians who have or may become responsible for the medical care of members of the services and of industrial workers and their families—and this is likely to include every physician in the United States.

OBITUARY

FRED ELLSWORTH CLOW

1881–1941

The practice of medicine, thank God, can produce strong men: men able to spread the gospel of truth and integrity over the four corners of the land. Fred Ellsworth Clow was one of these.

He graduated from the Harvard Medical School in 1904, a New Englander all the way back to the beginning and proud of it. He saw things straight and never compromised with his conscience.

He served as intern at the Elliott Hospital in Manchester and then returned to Wolfeboro, where he belonged. There is a Clow Hill at East Wolfeboro, and an old homestead, going back, I believe, to that Clow who left Wolfeboro in 1775 to go to the War.

Fred Clow became a tower of medical strength in his part of New Hampshire. He did everything that could be expected of an intelligent, energetic, vitally alive doctor. He had a large practice. On the day of his funeral, flags all over the town were at half mast, and the schools and stores and offices of the village were closed. No one in the town could go about his ordinary business at such a time.

Fred Clow had a hand in almost everything in the way of progress that was going on in his community. He had been secretary-treasurer of the New Hampshire Board of Registration in Medicine. He took an active interest in the affairs of the New Hampshire Medical Society, serving as speaker of the House of Delegates and on a variety of committees. He was health officer in Wolfeboro, and at one time, president of the Carroll County Medical Society. He was a deacon of the First Congregational Church and had served as presi-

dent of the Wolfeboro Rotary Club. Of all his accomplishments he was proudest of having built up the Huggins Hospital into a model community hospital, perfectly equipped and effectively run.

He believed in keeping up with the times. He regularly attended the meetings of the American Medical Association and the American College of Physicians, and he went abroad a couple of times to see what was going on in the medical world of Europe. Hence he had a wide medical friendship.

He had an incisive way of speaking, with a shrewd ability to separate what was false from what was true; and an insight into human nature so that he could ferret out dishonesty and chicanery. He was an admirer of Abraham Lincoln and a keen student of his writings. Perhaps he acquired some of Lincoln's characteristics by being so familiar with them.

Fred Clow died when he was only fifty-nine years old. But in a sense he is not dead, for his influence will be felt in New England medicine for many years to come.

R. F.

MEDICAL EPONYM

VON GRAEFÉ'S SIGN

This was described by Albrecht v. Graefe (1828-1870) at a meeting of the Berlin Medical Society on March 9, 1864, and was reported in the *Deutsche Klinik* (16:158, 1864), under the title "Ueber Basedow'sche Krankheit [Concerning Basedow's Disease]." A portion of the translation follows:

When we cause the healthy person to look up and down, the upper eyelid moves correspondingly. In those suffering with Basedow's disease, this motion is almost completely abolished or reduced to a minimum: that is, when the cornea is turned downward, the upper eyelid does not follow. This is not a direct result of the exophthalmos, because in the presence of tumors of the orbit or other causes of protrusion, the symptom is frequently absent, although in very marked degrees the motions of the lid are naturally interfered with. On the other hand, it is present in the mildest degree of exophthalmos in Basedow's disease. . . . It is apparently to be regarded as a peculiar disturbance of the innervation of the muscles of the eyelid.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

RESOLUTION ON THE DEATH OF DR. EDWARD MELLUS

The medical profession, as well as the entire citizenry of Newton, has suffered a severe loss in

the sudden passing of Dr. Edward Mellus on December 7, 1940.

Dr. Mellus was born in Zumbrota, Minnesota, sixty-eight years ago, and when a boy lived in Newton for two years attending the Newton High School with the Class of 1890. He attended the fiftieth reunion of that class two days before his death. He graduated from Worcester High School in 1891, Harvard College in 1895 and Harvard Medical School in 1898. He enlisted at once in the Medical Corps of the United States Army and served in Cuba during the Spanish-American War.

On his return to Massachusetts he became resident physician at several state hospitals for the insane, including Mattapan, Foxboro and Worcester. He next assumed the management of the Paine Sanitarium at West Newton, and later moved this institution for nervous and mental cases to the Hopewell estate on Waverley Avenue. He retired from active practice in 1929, but still was often called for consultation for mental and nervous conditions. He was the consulting psychiatrist for the Newton Hospital from 1929 until his death.

His activities were not limited to professional interests. He served as a member of the Newton Planning Board and of the Newton Board of Health. He was a 32nd degree Mason, a Shriner and member of the Rotary Club of Newton, of the Hunnewell Club, of the Newton Medical Club, of which he was a past president, of the Massachusetts Medical Society and of the New England Society of Psychiatry.

He was richly endowed by nature, education and experience and contributed generously to every organization to which he belonged. He will long be remembered as a genial companion, possessing rare wit and ready repartee, which enlivened any assembly at which he was present. But the greatest contribution was his effort to improve the diagnosis, care and possible relief of that large and much misunderstood group who suffer from mental deficiencies and diseases. His kindly manner and gentle technic, sustained by a wealth of scientific knowledge and genuine sympathy for the afflicted, endeared him to his professional associates, the public and, most of all, to that special group who consulted him for advice and assistance.

FRANK R. CLARK, M.D.,
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Resolution Committee, Newton Hospital.

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

FORCEPS DELIVERY IN A PATIENT WITH MITRAL STENOSIS

Mrs. B. P., a twenty-seven-year-old primipara, was first seen on December 29, 1939, when she was approximately eight weeks pregnant.

The family history was noncontributory. The patient had had rheumatic fever at the age of twelve and had also had the usual childhood diseases. The tonsils had been removed. Catamenia began at fourteen, were regular with a twenty-eight-day cycle and lasted seven days without pain. The last regular period began on November 4, making the expected date of confinement, August 11, 1940.

Physical examination at the time of her first visit showed a well-developed and well-nourished woman. The weight was 124 pounds. The heart showed definite evidence of disease. The lungs were clear and resonant; there were no rales. The blood pressure was 160 systolic, 60 diastolic. Vaginal examination showed that the fundus was anterior and that the patient was probably pregnant. Because of the definite cardiac abnormality the possible seriousness of the situation was discussed with the patient and a consultation with a cardiologist was advised and accepted.

The consultant's note read as follows: "The patient has a moderately enlarged heart, a systolic murmur, and a late crescendo mitral diastolic murmur. The blood pressure is 160 systolic, 40 to 10 diastolic. She has, then, mitral stenosis, with aortic regurgitation. The electrocardiogram is not informative." The consultant considered it not unreasonable for the patient to continue pregnancy, since she had had no history of decompensation. He advised her to observe the usual restrictions of a cardiac patient and to be followed closely throughout pregnancy.

The patient was seen by the obstetrician and the cardiologist frequently during her pregnancy, which progressed normally. The total weight gain was 17 pounds. There were no cardiac symptoms except that during a cold she developed a good deal of discomfort over the precordium, an elevation of the pulse and a cough.

On July 31, 1940, following an office visit, the patient had a slight bloody discharge and was sent into the hospital. The next morning the

membranes ruptured spontaneously, and good labor began about noon. She was given 1/6 gr. morphine and 1/200 gr. scopolamine. At 1:30 p.m., the cervix was extremely soft, flat and dilated sufficiently to admit three fingers. The progress of labor was not rapid, and she was delivered shortly after 4:00 p.m. by simple forceps under nitrous oxide, oxygen and ether anesthesia of a living male child weighing 8 pounds, 1 ounce. The convalescence was uneventful.

The patient was seen in the office on September 25. The condition of the heart was as before; there was no evidence of increased damage.

Comment. This case of heart disease was recognized by the obstetrician and immediately referred to a cardiologist. The patient was advised to take much more rest than the ordinary patient from the very beginning of her pregnancy, and at times she was in bed the better part of two or three days every week. At no time was there any evidence of decompensation.

Induction of labor was entertained when the patient was approximately thirty-eight weeks pregnant. Spontaneous labor, however, began the next day, and although the labor was not so short as had been anticipated, the heart withstood the strain, and there were no cardiac complications. The patient was given morphine, scopolamine and nitrous oxide, oxygen and ether anesthesia, but no other medication.

The present opinion that labor in cardiac patients rarely induces decompensation was borne out in this case. Had the head not been in the pelvis or had labor started with an unobliterated cervix, cesarean section would have been considered. When the head is well engaged and the cervix is obliterated and propitious before labor starts, vaginal delivery is now generally considered the more conservative procedure.

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning February 23:

MIDDLESEX EAST

Tuesday, February 25, at 4:15 p.m., at the Melrose Hospital, Melrose. Head Colds and Complications. Instructor: Charles T. Porter. Walter H. Flanders, *Chairman*.

MIDDLESEX SOUTH

Tuesday, February 25, at 4:00 p.m., at the Cambridge Hospital, Mt. Auburn Street, Cambridge. Recent Advances in Medical Therapeutics. Instructor: G. Philip Grabfield. Dudley Merrill, *Chairman*.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

NORFOLK

Thursday, February 27, at 8 30 p.m., at the Norwood Hospital, Norwood Pediatric Case Discussions Instructor Louis K. Diamond Hugo B. C. Riemer, *Chairman*

NORFOLK SOUTH

Monday, February 24, at 8 30 p.m., at the Quincy City Hospital, Quincy Diagnosis, Treatment and Prognosis of Central Nervous System Syphilis Instructor Francis M. Thurmon David L. Belding, *Chairman*

SUFFOLK

Thursday, February 27 at 4 30 p.m., in John Ware Hall, Boston Medical Library Obstetric Complications with Case Histories and Clinical Problems Instructor Judson A. Smith Reginald Fitz, *Chairman*

NEW HAMPSHIRE MEDICAL SOCIETY

DEATHS

CLOW—FRED E. CLOW, M.D., died suddenly Saturday January 4, at his home in Wolfeboro, in his sixtieth year. He was born in East Wolfeboro, the only son of Stephen W. and Carrie (Canney) Clow. He graduated from Brewster Academy in 1900 and received his degree from Harvard Medical School in 1904. Through his vision, foresight and energy, the Huggins Hospital was established in 1907, and it was largely through his effort that the present modern hospital was erected in 1925.

Dr. Clow was secretary treasurer of the New Hampshire Board of Registration in Medicine, trustee of Brewster Academy, fellow of the American College of Physicians and member of the American Medical Association, the New Hampshire Medical Society and the Carroll County Medical Society.

Survivors are four children: Mrs. W. J. Paul Dye, of Wolfeboro; Mrs. Joseph Culick, of Exeter; and Stephen E. Clow and Dr. John H. Clow, of Rochester.

HUBBARD—OSMON H. HUBBARD, M.D., of Keene, aged seventy-eight, died suddenly at his home on January 5. He was born in Sullivan, July 23, 1862, a son of Mr. and Mrs. George C. Hubbard. He graduated from McGill University Faculty of Medicine in 1888, and had practiced in Fitzwilliam, Walpole and Needham, Massachusetts, and in Gilsum and Keene, New Hampshire. Dr. Hubbard had specialized in diseases of the nose, throat and ears for many years and had given up this more active work to become pathologist at the Elliot Community Hospital about a year ago. He was a fellow of the New Hampshire Medical Society and of the American Medical Association.

Dr. Hubbard is survived by one brother, Charles L. Hubbard of Jamaica Plain, Massachusetts.

MacKENZIE—NICHOLAS Y. B. MacKENZIE, M.D., of Andover, died November 27, 1940. He was in his sixty-sixth year.

Born in Ellsworth, Maine, Dr. MacKenzie received his degree from Dartmouth Medical School in 1901. He interned in New York and Boston hospitals and settled in Andover in 1917, after having practiced in Salisbury and Gilmanton.

His widow and six children survive him.

MISCELLANY

PHYSICIANS GROUP OVER THE TOP

The Physicians Group more than contributed its quota in the recent drive of the Greater Boston Community Fund. With the total set at \$20,500, approximately seven hundred physicians contributed \$20,795, or 101.4 per cent of the quota.

JOHN PHILLIPS MEMORIAL AWARD

On the recommendation of the Committee on Fellowships and Awards the Board of Regents of the American College of Physicians, by unanimous resolution, has voted that the John Phillips Memorial Medal for 1941 be awarded to Dr. William C. Stride, associate professor of research medicine, University of Pennsylvania, for his significant contributions to the knowledge of anemia, cyanosis and the physical chemistry of hemoglobin and more especially for his recent studies on the subject of fat metabolism in diabetes mellitus.

This award was established on October 27, 1929, to be given periodically for some outstanding piece of work in internal medicine. Internal medicine is interpreted to include not only clinical science, but all subjects that have a direct bearing on the advance of clinical science. The work must be done in whole or in part in the United States or in Canada.

Nominations for the award are made to the Committee on Fellowships and Awards of the American College of Physicians. The recipient must file a written account of his work, and must present his results as a paper before the annual session, at which time the award of a bronze medal is made by the president.

AID FOR PHYSICIANS' CHILDREN IN ENGLAND

The Physicians' Wives League of Greater New York, 75 East 86th Street, has raised among its members \$150 which has been contributed through the Save the Children Federation to assist five physicians' children among the child victims of the war in Great Britain. This donation is a part of the money transmitted to England in the federation's nation-wide endeavor to provide American godparents for British and other children now being cared for in England at the rate of \$2.50 per month for each child. Nearly 6000 children who have been bombed from their own homes or who have otherwise suffered in the war now have this American godparent assistance.

Many physicians, surgeons, nurses and others connected with the profession are among the godparents, who represent every state in the Union. The federation's headquarters are in the Metropolitan Tower, 1 Madison Avenue, New York City.

CORRESPONDENCE

GONOCOCCUS COMPLEMENT FIXATION TESTS

To the Editor: At its meeting on January 21, the Public Health Council voted that in view of the rapidly increasing burden of work at the Wassermann Laboratory and the questionable value of the gonococcus complement fixation test the routine performance of these tests should be discontinued. In order to give physicians due notice of this action it is planned to continue the routine performance of these tests on request through the month of Feb-

ruary. Beginning March 1, however, these tests will no longer be performed.

PAUL J. JAKMAUH, M.D.,
Commissioner of Public Health.

State House,
Boston.

REQUEST FOR INFORMATION IN REGARD TO THE NUMBER OF DIABETIC CHILDREN IN MASSACHUSETTS

To the Editor: There are many diabetic children under the age of fifteen years in Massachusetts, but how many no one knows. The number is increasing, because formerly they lived only one or two years but now they enter manhood and womanhood.

If we knew how many of these children there were in the State we should all be in a better position to advise as to their future.

I should consider it a great favor if any of your readers would notify me if they now know or have under their care any diabetic children under the age of fifteen. To save duplication I should appreciate the following data:

1. Name or initials of the child
2. Residence (city or town)
3. Sex
4. Race or nationality
5. Year of birth (age)
6. Year of onset of diabetes (duration)

Signed (physician or hospital)
Address

On receipt of a postal card I shall gladly send cards made out as above to any physician or hospital, but the number of children in the State is so small that I hesitate to send out letters like this with envelopes for reply to each of the 7839 physicians in Massachusetts.

ELLIOTT P. JOSLIN, M.D.

81 Bay State Road,
Boston.

REPORT OF MEETING

HARVARD MEDICAL SOCIETY

A regular meeting of the Harvard Medical Society was held at the Peter Bent Brigham Hospital on November 26, 1940, with Dr. Elliott C. Cutler presiding.

The first case, presented by the Surgical Service, was that of a young man with a history compatible with that of peptic ulcer, who entered with signs and symptoms of diffuse peritonitis. Roentgenograms demonstrated air under both diaphragms, and an operation was performed. At that time a perforation of a Peyer's patch, secondary to typhoidal infection, was found. The abdomen was closed without drainage, and the patient was put on Ochsner's regimen, with Wangenstein drainage, 100 per cent oxygen, Fowler's position, and morphine at regular intervals. The serum protein never fell below 5.9 gm. per 100 cc. The patient was given several blood transfusions and made a satisfactory recovery.

The second case, presented by the Medical Service, was that of a thirty-three-year-old woman who had drunk moderate amounts of alcohol for fifteen years and extremely large amounts for the previous five or six years. She had eaten very little food for a few months, and had noticed nausea and vomiting for the last five days. There had been increasing constipation for six months, with an increase in girth for one month and obstipation for seven days. She had recently been disorientated and noisy at

night. Physical examination revealed puffy cheeks, with telangiectases. The patient was disorientated, with visual hallucinations and confabulation. The scleras were jaundiced, horizontal eye movements were poor, the tongue was smooth and red, and there were pulmonary emphysema, doughy edema and an enlarged abdomen. The temperature was 101°F., the pulse 140, and the respirations 20. The icteric index was 15, the venous pressure 130 mm. of water, the circulation time 14 seconds, the red-cell count 3,500,000 with a hemoglobin of 85 per cent, and the white-cell count 17,000. The urine had a slight trace of albumin, the white blood cells in the sediment increasing from 5 to 50 per high-power field after admission. The blood urea nitrogen, originally 74 mg. per 100 cc., rose to 91 mg. Further examination of the abdomen revealed distended loops of bowel, normal peristalsis, and tenderness in the right upper quadrant, with no liver dullness. There were hypesthesias of the lower arms and legs, a loss of fine movements, sluggish tendon reflexes and tender calf muscles. The course under intensive vitamin therapy was one of clinical improvement, although there were still some hallucinations. Dr. Elliott C. Cutler suggested that the gas in the bowel might be on a neurologic basis and that novocain injection of the spinal cord should probably have been tried. Dr. John Romano stated that the patient had a definite Korsakoff syndrome, with a question of Wernicke's syndrome. Dr. Soma Weiss remarked that abdominal distention from acute or chronic alcoholism is not uncommon and may possibly be of neurologic origin. On the other hand, alcoholic patients may rupture an ulcer or appendix during a spree, presenting themselves later with distention and no spasm.

Dr. Jacob Fine, of the Beth Israel Hospital, addressed the society on "Clinical and Experimental Studies in Intestinal Obstruction." He pointed out that to simplify the study of intestinal obstruction it is best to omit a consideration of its complications, that is, strangulation and peritonitis. These are of clinical importance, but serve only to confuse an understanding of the basic processes involved. Most of the experimental work on the etiology of intestinal obstruction centers around a search for a circulating toxin, or an effort to explain all the phenomena involved by water and electrolyte imbalance. The evidence for a toxin remains unconvincing, and clinical experience has demonstrated the inadequacy of therapy for chloride, water and sodium imbalance. Uncomplicated high intestinal obstruction is consistent with life until death from starvation ensues, so long as water and electrolytes are adequately replaced. If the deficiency of these substances were the crucial factor in uncomplicated intestinal obstruction, it should be possible to maintain life in low obstruction of the small intestine for as long a time by similar therapy. Since this has not been possible, the assumption is that there is a basic difference between the two levels of obstruction. That difference consists in the ability of the bowel to decompress itself more effectively when the obstruction is high than when it is low, so that what seems of primary significance is the increase in intraintestinal pressure. The large literature on the effects of increased pressure is confusing because of conflicting results. Many of the conclusions drawn are not convincing for the reason that the pressures used were far in excess of those known to exist clinically in the intestine during obstruction. Another difficulty is the variety of technics utilized. Dr. Fine presented the following simple procedure, which has formed the basis of his studies: the small bowel or the stomach and small bowel of a cat, free of fluid and gas, is tied off at both ends, thus

preventing access to swallowed air or to fluid, except se- cretions, in other words the intestine is converted into an empty, closed loop

Such a loop remains substantially free of gas and fluid after one or more days. Examination of such loops shows some edema and engorgement at the cecum end. Other- wise the bowel is normal, and there is no peritonitis. If a similar loop, with the stomach excluded, is distended with nitrogen under slight positive pressure, the volume of gas injected remains about the same after twenty four hours, if the animal is caused to breathe pure oxygen continuously from the time of inflation of the loop, the volume of gas after twenty four hours averages 40 per cent of the original. The amount of fluid recovered from such loops, whether the animals breathe air or oxygen, is negligible. If the pressure in an empty collapsed loop is gradually raised for six hours by a constant stream of air or nitrogen and if the loop is allowed to decompress itself spontaneously, the pressure falls slightly or moderately and death results in an average of fourteen hours. The survival time is inversely proportional to the height of the final pressure. But if in a similar group of experi- ments the animal is given pure oxygen to breathe at the time when spontaneous decompression begins, the intra- intestinal pressure falls steadily toward zero, and the sur- vival time is very much prolonged. This effect of oxygen cannot be attributed to the general sustaining qualities of oxygen but, as a number of previous publications have shown, to the fact that breathing pure oxygen facilitates an increased rate of absorption of nitrogen. The differ- ence in the average amount of peritoneal and intraintes- tinal fluid between the animals breathing air and oxygen was 16 cc. so that the more rapid death of the air breathing animals cannot be explained on the basis of a greater fluid loss. In previous experiments in which a va- riety of foods were introduced into such loops, the time of survival was proportional not so much to the fluid loss or to the volume of gas as to the rapidity with which ten- sion developed. In general the shortest survival times were associated with the highest tensions. It is obvious that the kind and amount of food present in the intestine at the time obstruction begins, or swallowed during the course of the process, determine to a considerable extent the intraintestinal pressure and the progress of the dis- ease.

Death occurred in the experiments with empty loops distended with nitrogen in the absence of a significant loss of water and electrolytes, plasma or blood into the perito- neal cavity or bowel. The total fluid recovered in air breathing animals from the peritoneal cavity, bowel wall and bowel lumen averaged 37 cc., in the oxygen breathing animals 21 cc., and in control animals with undistended loops 11 cc. Such fluid losses cannot account for death even though they may be regarded as contributory.

In a search for other causes for the death produced by increased intraintestinal pressure, the problem was viewed in terms of the effects of distention, which is a necessary concomitant of increased pressure. The femoral venous pressure showed a marked rise in all experimental an- imals with distention. But no clear evidence of fluid loss into the lower extremities was demonstrable. A simulta- neous study of plasma volume changes, however, showed that plasma was being lost in substantial quantities. In dogs the loss reached as much as 55 per cent, which is sufficient to explain death. Occasionally such a loss was observed when only a few feet of small intestine were distended so that the factor of distention of the perito- neal cavity seems to have been excluded. Plasma loss in peritoneal distention was occasionally observed, but the

loss was usually not sustained. Furthermore, distention of the colon in dogs, which produces a marked distention of the peritoneal cavity, was not accompanied by plasma loss. The plasma loss in obstruction of the small intestine was therefore considered specific for that part. Indeed, at least so far as local plasma loss is concerned, clinical ob- servation shows that an excess of peritoneal fluid is not a prominent factor in obstruction of the colon, but is not in frequently seen in advanced small bowel obstruction.

It therefore appears that although part of the plasma is lost in the gastrointestinal tract and peritoneal cavity, the amount recoverable from these areas is only a fraction of the total amount lost, which, in animals at least, is exten- sive enough to explain death.

That plasma loss is a direct effect of distention was shown in the recovery of plasma volume following the institution of decompression. Plasma replacement in a group of dogs definitely prolonged their lives for a period comparable to that of undistended dogs otherwise treated in the same fashion. Replacement of lost plasma by intra- venous saline did not prolong life. Some of the results detailed above, especially the loss of plasma during ob- struction with distention and return of lost plasma on re- lief of the distention, have been confirmed in patients.

Acute plasma loss is common to many rapidly fatal con- ditions but it cannot be regarded as a nonspecific terminal event in intestinal obstruction, because the loss of plasma in such cases is large and significant from the very onset of the distention. The analogy between intestinal obstruc- tion and traumatic shock recalls various efforts to explain shock on a neurogenic basis. The evidence for the protec- tive effect of denervation of distended loops was not con- firmed in the experiments in which the denervation con- sisted of removal of the celiac ganglion and division of both vagus nerves.

SPECIAL NOTICE

MASSACHUSETTS MEDICAL SOCIETY COMMITTEE ON STATE AND NATIONAL LEGISLATION

The following bills are scheduled for hearings the week of February 24

February 25

S 485 (Public Health) Petition of Robert T. Monroe proposing legislation relative to admission to licensed practice of medicine. This bill makes requirements for registration in medicine the same as the National Board of Medical Examiners. *Favored*

H 1564 (Public Health) Same as S 485

S 560 (Public Health) Petition of Bertram A. Har- ris and others for legislation relative to the qualifications of applicants for registration as qualified physicians and examinations thereof. This bill annuls the power of the Approving Authority. *Opposed*

H 114 (Public Health) Bill (accompanying H 113, recommendations of the Board of Registration in Medi- cine) relative to providing for the annual registration of physicians and the biennial publication of the list of physicians duly registered—the perennial annual registration bill. *Opposed*

H 115 (Public Health) Bill (accompanying H 113, recommendations of the Board of Registration in Medi- cine) relative to the recording of the certificate of regis- tration of a qualified physician by the town clerk. This bill only adds a new penalty to existing laws. *Opposed*

H 116 (Public Health) Bill (accompanying H 113,

recommendations of the Board of Registration in Medicine) relative to establishing a special commission to investigate and study the advisability and practicability of requiring special qualifications of all physicians who engage in the practice of surgery. This should be handled by the Massachusetts Medical Society; it is a matter of education rather than one of legislation. *Opposed.*

H. 272 (Public Health). Petition of Harold W. Sullivan that there be appropriated from the treasury of the Commonwealth the sum of twenty-five thousand dollars to provide for an investigation by the Board of Registration in Medicine relative to the practice of medicine. Under the present law the Board has adequate power to investigate, and funds should be obtained in the usual way. *Opposed.*

H. 611 (Public Health). Petition of James A. Vahey for legislation relative to the qualifications for applicants for registration as qualified physicians. This bill postpones the effective date of the Approving Authority from 1941 to 1945. *Opposed.*

H. 1229 (Public Health). Petition of Domenic Staziani for legislation to protect persons needing medical care and relative to the registration of students of medicine. *Opposed* (as drawn).

February 26

S. 502 (State Administration). Petition of Joseph C. Basso for legislation to provide for the regulation of the practice of osteopathy and for the establishment of a state board of osteopathic examination and registration. *Opposed.*

February 27

H. 609 (Public Health). Petition of Annie D. Brown for legislation to provide further for regulating the practice of physicians and surgeons. A perennial impracticable bill. *Opposed.*

H. 610 (Public Health). Petition of Annie D. Brown for amendment of the law regulating the practice of physicians and surgeons in certain cases. A perennial impracticable bill. *Opposed.*

H. 1838 (Public Health). Petition of J. Arthur Moriarty and others for legislation to provide for nonprofit medical-service plans. The White Cross bill. *No action.*

NOTICES

BOSTON GASTROENTEROLOGICAL SOCIETY

There will be a meeting of the Boston Gastroenterological Society in the amphitheater of the Beth Israel Hospital on Wednesday, February 26, at 12 noon. An x-ray conference on gastrointestinal diseases by Dr. Samuel A. Robins and his associates will take place.

GREATER BOSTON MEDICAL SOCIETY

The next meeting of the Greater Boston Medical Society will take place on Tuesday, March 4, in the auditorium of the Beth Israel Hospital at 8:15 p.m.

PROGRAM

Factors that May Induce Cardiac Infarction. Dr. Ernst P. Boas, assistant professor of medicine, Columbia University College of Physicians and Surgeons. Discussion will follow by Drs. Herman L. Blumgart, Samuel A. Levine and Samuel H. Proger.

BOSTON MEDICAL HISTORY CLUB

The next meeting of the Boston Medical History Club will take place on Monday, February 24, at the Boston Medical Library, 8 Fenway, Boston, at 8:15 p.m. Dr. Alan R. Moritz will speak on "Peaks in the History of Legal Medicine."

All interested persons are cordially invited to attend.

JEWISH MEMORIAL HOSPITAL

There will be a staff meeting of the Jewish Memorial Hospital in the hospital auditorium, 45 Townsend Street, Roxbury, on Thursday, February 27, at 8:30 p.m.

PROGRAM

Some Important Errors in the Diagnosis of Heart Disease. Dr. Samuel A. Levine.

Collation.

The medical profession is invited to attend.

JOHN T. BOTTOMLEY SOCIETY

The regular monthly meeting of the John T. Bottomley Society will be held in the Out-Patient Building of the Carney Hospital on Tuesday, March 4, at 11:30 a.m. Dr. Herbert Finn will speak on "Some Recent Advances in Surgery."

Physicians and students are cordially invited to attend

TUFTS COLLEGE MEDICAL SCHOOL ALUMNI ASSOCIATION

The forty-seventh anniversary of the Tufts College Medical School Alumni Association will be celebrated at its annual dinner on Wednesday, March 26, at 7 p.m., at the Hotel Somerset, Boston.

CONSULTATION CLINICS FOR CRIPPLED CHILDREN IN MASSACHUSETTS, UNDER THE PROVISIONS OF THE SOCIAL SECURITY ACT

CLINIC	DATE	CLINIC CONSULTANT
Salem	March 3	Harold C. Bean
Haverhill	March 5	William T. Green
Lowell	March 7	Albert H. Brewster
Gardner	March 11	Mark H. Rogers
Brockton	March 13	George W. Van Gorder
Pittsfield	March 17	Frank A. Slowick
Northampton	March 19	Garry deN. Hough, Jr.
Worcester	March 21	John W. O'Meara
Fall River	March 24	Eugene A. McCarthy
Hyannis	March 25	Paul L. Norton

NEW ENGLAND ROENTGEN RAY SOCIETY

The next meeting of the New England Roentgen Ray Society will be held in John Ware Hall, Boston Medical Library, on Friday, February 28, at 8:30 p.m.

PROGRAM

Spinal-Canal Block as Demonstrated by Air Myelography. Dr. Wendell C. Hall.
Heavy-Metal Lines in Epiphyseal Ends of Growing Bones. Dr. Ralph T. Ogden.
Osteitis Tuberculosis Multiplex Cystica. Dr. Max Kliman.
Roentgen Diagnosis in Neurocutaneous Syndromes. Dr. Gilbert W. Heublein.
Atypical Bone Tumors. Dr. Douglas J. Roberts.

NEW ENGLAND OTO-LARYNGOLOGICAL SOCIETY

The regular spring meeting of the New England Oto-Laryngological Society will be held on Wednesday, March 19, at the Massachusetts Eye and Ear Infirmary, 243 Charles Street, Boston, at 4 p.m. The evening program will be devoted to a symposium on "The Management of Some of the Complications Arising from Acute and Chronic Otitis Media." Discussion will follow by Drs. Harold Tobey, Charles T. Porter, Maxwell Finland, Champ Lyons, W. Jason Mixter and Charles S. Kubik.

MASSACHUSETTS DEPARTMENT OF CIVIL SERVICE AND REGISTRATION

Medical Inspector of Schools and Working Children, Health Department, North Adams, \$1500 a Year

Director of State Civil Service, Ulysses J. Lupien, has recently announced that a competitive examination is to be held on April 5 in order to find eligibles for appointment to the position of medical inspector of schools and working children, Health Department, North Adams.

The entrance requirements are as follows: applicants must be registered physicians under the State Board of Registration in Medicine. The subjects and weights of the examination are as follows: training and experience, 2; practical questions, 3; total, 5. Applicants must obtain a grade of 70 per cent in each subject in order to become eligible. The last date for filing applications is Saturday, March 22, at 12 o'clock noon.

SIXTH ANNUAL POSTGRADUATE INSTITUTE OF THE PHILADELPHIA COUNTY MEDICAL SOCIETY

The Sixth Annual Postgraduate Institute of the Philadelphia County Medical Society will take place from March 31 to April 4 at the Bellevue-Stratford Hotel, Philadelphia. "Symposiums on Modern Therapy" will be the title of the meeting. Further information may be obtained by writing to Postgraduate Institute, Philadelphia County Medical Society, 301 South Twenty-First Street, Philadelphia, Pennsylvania.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, FEBRUARY 23

SUNDAY, FEBRUARY 23

- 11 a.m. Fatigue and Health Dr. David B. Oll Free public lecture Harvard Medical School Building D
- 11 p.m. Your Nose and Your Throat What about them? Or Edmund J. Butler Cambridge Hospital Margaret Jewett Hall

MONDAY, FEBRUARY 24

- 12:15-1:15 p.m. Clinicopathological conference Peter Bent Brigham Hospital amphitheater
- *8:15 p.m. New England Heart Association Beth Israel Hospital
- *8:15 p.m. Peaks in the History of Legal Medicine Dr. Alan R. Moritz Boston Medical History Club Boston Medical Library 8 Fenway

TUESDAY, FEBRUARY 25

- *9-10 a.m. Ray demonstration Or Alice Ettinger Joseph H. Pratt Diagnostic Hospital
- 12:15-1:15 p.m. Clinicoradiological conference Peter Bent Brigham Hospital amphitheater

WEDNESDAY, FEBRUARY 26

- *9-10 a.m. Hospital case presentation Or S. J. Thannhauser Joseph H. Pratt Diagnostic Hospital
- *12 m. Clinicopathological conference Children's Hospital
- 12 m. Boston Gastroenterological Society Beth Israel Hospital
- *2-4 p.m. Hematuria and Dysuria Ors W. C. Quinby and F. A. Stead Peter Bent Brigham Hospital.

THURSDAY, FEBRUARY 27

- *8:30 a.m. Combined clinic of the medical, surgical, orthopedic and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital, at the Peter Bent Brigham Hospital
- *9-10 a.m. Gastrointestinal clinic Or. K. S. Andrews Joseph H. Pratt Diagnostic Hospital
- 8:15 p.m. New England Section of the American Urological Association Harvard Club of Boston
- *8:30 p.m. Some Important Errors in the Diagnosis of Heart Disease Dr. Samuel A. Levine Jewish Memorial Hospital, 45 Townsend Street, Roxbury

FRIDAY, FEBRUARY 28

- *9-10 a.m. Amenorrhea and Abnormal Bleeding Dr. J. V. Meigs Joseph H. Pratt Diagnostic Hospital
- 8:15 p.m. Massachusetts Memorial Hospitals Evans Memorial Auditorium
- 8:30 p.m. New England Roentgen Ray Society Boston Medical Library, 8 Fenway

- *Open to the medical profession
- †Open to the public

- MARCH 4—Greater Boston Medical Society Page 348
- MARCH 4—John T. Bottomley Society Page 348
- MARCH 8—American Board of Ophthalmology Page 201, issue of August 1
- MARCH 12-14—New England Hospital Assembly Hotel Statler, Boston
- MARCH 13—Pentucket Association of Physicians Page 263, issue of August 15
- MARCH 19—New England Oto-Laryngological Society Notice above
- MARCH 21-22—New York University College of Medicine, Alumni Day Page 135, issue of January 16
- APRIL 21-25—American College of Physicians Page 1605, issue of June 20
- MARCH 26—Tufts College Medical School Alumni Association Page 348
- MARCH 31-APRIL 4—Sixth Annual Postgraduate Institute of the Philadelphia County Medical Society Notice above
- APRIL 28-30—American Academy of Physical Medicine Scientific session Hotel Pennsylvania, New York City
- MAY 21, 22—Massachusetts Medical Society, Boston
- MAY 28-JUNE 2—American Board of Obstetrics and Gynecology Page 262, issue of February 6
- JUNE 2-6—American Medical Association Cleveland Ohio
- OCTOBER 14-17—American Public Health Association Page 135, issue of January 16

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

- MARCH 5—X-ray in Heart Disease Dr. Merrill C. Sosman Essex Sanatorium, Middleton
- APRIL 2—Pediatric Problems in General Practice Or Joseph Garload, Addison Gilbert Hospital, Gloucester
- MAY 14—Relation of the Doctor to the Law Mr. Leland Powers New Ocean House Swampscott

FRANKLIN

- MARCH 11
- MAY 13
- Meetings will be held at 11 a.m. at the Franklin County Hospital, Greenfield

NORFOLK

- FEBRUARY 25—Page 304, issue of February 13
- MARCH 25—To be announced
- MAY 8—Censors' meeting Hotel Puritan

SUFFOLK

- APRIL 30—Page 604, issue of October 10
- MAY 1—Censors' meeting Page 261, issue of February 6

WORCESTER

- MARCH 12—Memorial Hospital, Worcester
- APRIL 9—Hahnemann Hospital, Worcester
- Supper at 6:30 p.m. followed by a business meeting and scientific program

BOOK REVIEWS

Manual of Medical and Surgical Emergencies. Edited by J. C. Geiger, M.D. 8th, cloth, 199 pp. San Francisco: J. W. Stacey, Incorporated. \$2.50.

This work is a compilation of facts about medical and surgical emergencies in a single, handy volume. The

need for such a book is rather limited. It should be of most assistance to the beginner on an emergency service of any large city hospital, where quick decisions are so often necessary.

Simplified Diabetic Manual, with 163 International Recipes (American, Jewish, French, German, Italian, Armenian and so forth). By Abraham Rudy, M.D. Introduction by Frederick M. Allen, M.D. 8°, 216 pp., with tables, charts and illustrations. New York: M. Barrows and Company, Incorporated, 1940. \$2.00.

The new edition of this useful manual, formerly entitled *Practical Handbook for Diabetic Patients*, presents many diet forms adapted to the dietary customs of patients of many nationalities. The description of the use of protamine zinc insulin and crystalline insulin, together with a simple discussion of the vitamins, will aid the physician in securing the necessary co-operation of diabetic patients.

The Diagnosis and Treatment of Pulmonary Tuberculosis. By John B. Hawes, 2d., M.D.; and Moses J. Stone, M.D. Second edition. With a foreword by Richard C. Cabot, M.D. 8°, cloth, 260 pp., with 75 illustrations. Philadelphia: Lea and Febiger, 1940. \$2.75.

Following the death of the senior author, this book now appears in a second edition, revised by Dr. Stone. It is still a "brief and concise textbook," as the first edition was intended to be, and will serve very well as a practical guide for the medical student and the practitioner. Changes in this edition include new chapters on allergy and immunity and on mental aspects of the disease. The chapters on primary tuberculosis, on collapse therapy and on x-ray diagnosis have been considerably revised.

The book will be criticized by some because it is too brief in some sections, whereas in others it includes material that may be considered superfluous. But it makes no claim to completeness, and the best selection of material must inevitably be to some extent a matter of individual judgment. The reviewer believes that the essentials have been adequately presented. And they are presented from the point of view of physicians who have had many years' experience with the disease and with the human beings affected by it. Sound common sense and consideration of the patient as a whole are the dominant notes.

The significance of contact, especially between children and tuberculous adults, is emphasized in relation to the patient's history and to the prevention of tuberculosis. Pleurisy, especially with effusion, is pointed out as being frequently a tuberculous manifestation calling for prolonged bedrest like other forms of tuberculosis, and it is shown that the pulmonary form may often be prevented by the proper care of pleurisy.

There is a simple presentation of the pathology of pulmonary tuberculosis, with a discussion of the exudative and proliferative types. Primary or childhood infections are considered in their clinical, pathological and x-ray aspects, and again the importance of family contact is stressed.

Among the newer developments discussed are improvements in collapse therapy. These include pneumolysis as an aid to pneumothorax, the improved technic of thoracoplasty, the use of bilateral pneumothorax and the abandonment of phrenic operations except for a restricted group of cases. Other advances mentioned are the value of gastric lavage in diagnosis, the more restricted reliance placed on heliotherapy and climate, and the newer con-

ceptions concerning the desirability or undesirability of a positive tuberculin reaction. It is pointed out that a primary infection in an adult is no worse than in a child, and that although it may confer a very slight degree of immunity, it also brings a much greater risk of subsequent reinfection tuberculosis than if the tuberculin reaction had remained negative.

The book is very simply written, and there is a brief summary at the end of each chapter. Also with each chapter are selected references to the literature. The illustrations are clear, and the x-ray photographs well reproduced. An index is included.

The Surgery of the Alimentary Tract. By Sir Hugh Devine, M.S., F.R.A.C.S., F.A.C.S. 8°, cloth, with 690 illustrations, some in color. Baltimore: Williams and Wilkins Company, 1940. \$15.00.

One of the common criticisms of surgical volumes is that they are largely compilations, that they are written by men who have the time in which to write but not the experience from which to draw. Such a criticism certainly cannot be made of this volume. It is outstandingly an individual's book, based on personal views and personal experience. It proposes to be that and refreshingly makes no effort to be anything else.

The work deals with but a limited number of surgical subjects, those particularly in which the author has been interested. It presents the views of a man busy in the practice of surgical diagnosis and surgical therapy. Dr. Devine has contributed many original and practical procedures to surgery, and the deductions by a person with such a large experience and with such an original mind are always of great interest and benefit to surgeons similarly occupied. The book is pre-eminently suited for those who have had considerable experience in surgery, but may be read with profit by those whose interests are surgical but who have not as yet had a large experience in it.

Physiology of Micturition: Experimental and clinical studies with suggestions as to diagnosis and treatment. By Orthello R. Langworthy, M.D., Lawrence C. Kolb, M.D., and Lloyd G. Lewis, M.D. 8°, cloth, 232 pp., with 49 illustrations. Baltimore: Williams and Wilkins Company, 1940. \$3.50.

This publication adds greatly to our present understanding of normal and abnormal functions of the urinary bladder. It contains the results of many experimental and clinical observations made during a period of seven years in the laboratories of the Johns Hopkins University School of Medicine and in the wards of the Johns Hopkins Hospital. For the first time the correlation between the complicated nerve supply of the bladder and its behavior in various forms of neurologic disease has been put on a logical basis. The literature on this subject, heretofore conflicting, has been carefully evaluated.

The book comprises six sections. The first concerns the anatomy of the urinary apparatus and its nerve supply; the second and third discuss the pharmacology and physiology; the fourth treats abnormalities of urination in diseases of the peripheral nerves and spinal cord; the fifth considers these in diseases of the brain; and the final section presents a summary of clinical experience in diagnosis and treatment.

The book deserves high commendation and will undoubtedly be of special interest to both clinicians and urologists, as well as to teachers of physiology.

The New England Journal of Medicine

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VOLUME 224

FEBRUARY 27, 1941

NUMBER 9

HERNIA AS THE PRESENTING COMPLAINT IN PATIENTS WITH CIRRHOSIS OF THE LIVER AND ASCITES*

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BOSTON

THE fact that patients with cirrhosis of the liver and ascites may first consult their physicians because of a hernia of the abdominal wall has received but little attention in the medical literature. Similarly, the frequency of hernia has not been generally appreciated. Chapman, Snell and Rowntree,¹ in 112 cases of ascites due to cirrhosis, found hernias in over 40 per cent. Of particular interest were 2 patients in whom ascites was first discovered during the course of herniorrhaphies. Observations in this clinic have amply corroborated these authors' conclusions as to the high incidence of hernia in patients with cirrhosis and ascites, and I have been impressed by the not infrequent fact that such patients may first request surgical rather than medical advice.

CASE REPORTS

CASE 1 (B I H 3698) R. A., a 20-year-old American Jewish salesgirl, entered the hospital complaining of "a rupture in the navel." Eight months previously, following an upper respiratory infection, a small mass appeared at the umbilicus. Two months before admission, her physician advised operation. Two weeks before admission, the mass became purple in color. The patient had gained an undetermined amount of weight in the 6 months before entry. Physical examination revealed an everted umbilicus with a mass 2 by 4 cm protruding through it. The abdomen was large, but no signs of fluid were elicited, the liver and spleen were not palpable. Slight edema of the ankles was noted. The skin was sallow. The diagnosis of cirrhosis was not considered, and herniorrhaphy was performed the day after admission. During the operation about 2500 cc of fluid flowed from the incision, which was then extended, revealing a large congested spleen and a very small, hard, hobnail liver. After operation the patient was drowsy and complained of itching, but no definite jaundice was discernible for 3 or 4 days, after which the icterus index was 30 and the serum bilirubin 21 mg per 100 cc. The patient failed rapidly and died on the 5th postoperative day. Postmortem examination revealed portal cirrhosis and splenomegaly.

The diagnosis of cirrhosis of the liver was not entertained until an operation for umbilical hernia was performed, when the liver was examined because a large amount of fluid was unexpectedly encountered.

CASE 2 (B I H 45242) G. H., a 36-year-old American machinist with a history of chorea at the age of 9 and mild dyspnea on exertion at the age of 28, visited his physician because of a rapidly enlarging mass in the right inguinal region. This was diagnosed as an inguinal hernia, and herniorrhaphy was recommended. At the time of operation for repair of the hernia a "large amount of fluid" ran out of the incision. A year later, 5 years before his death, the patient's abdomen and legs swelled, and abdominal paracenteses were performed every 2 months. Dyspnea, formerly mild, became severer, and repeated hospitalization was necessary for the treatment of both the congestive failure and hepatic cirrhosis. He died at the age of 42, 6 years after operation for hernia first revealed the presence of severe liver disease. Postmortem examination showed portal cirrhosis with splenomegaly, the heart was the seat of rheumatic valvular disease involving the mitral, aortic and tricuspid valves.

This patient had rheumatic heart disease, and his first symptoms were referable to the heart. A rapidly enlarging inguinal hernia was operated on, and the presence of ascites was thereby revealed, this was the first indication of severe liver disease, for it was not until a year later that the physical signs of ascites appeared.

CASE 3 (B I H 46485) B. L., a 74-year-old Russian Jewish tailor, whose brother had died of disease of the liver, developed attacks of upper abdominal pain, with chills and intermittent fever, 6 years before admission to the hospital, and icterus 18 months before admission. At this time he was studied at another hospital, where a diagnosis of gall bladder disease was made, operation was not performed, however, because of the possibility of the presence of hepatitis. The patient then felt well for 1 year, but 5 months before admission noted a mass in the left inguinal region. He came to the Out Patient Department, where he was given a truss. Five months later the abdomen and legs swelled, and he was accordingly admitted to the medical ward. Examination at this time revealed marked icterus, a large amount of ascites, an enlarged liver, a large

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left indirect inguinal hernia and marked edema of the legs. The patient was transferred to the Surgical Service, and a choledochostomy was performed. Many liters of ascitic fluid were removed during the operation. The liver was nodular and deeply bile stained, and the common bile duct contained many stones. The patient failed to improve after operation and died several days later. Post-mortem examination revealed acute and chronic cholangitis and biliary cirrhosis.

This patient with known disease of the gall bladder developed a large inguinal hernia five months before signs of ascites appeared. The presence of hepatitis had been suspected earlier as a result of the occurrence of chills and fever together with the onset of icterus. Nevertheless the development of the hernia was not regarded as an integral part of the pathologic process, that is, as an indication of ascites due to biliary cirrhosis secondary to gall-bladder disease.

CASE 4 (B. I. H. 50239). S. M., a 53-year-old Latvian-Jewish painter, came to the Out-Patient Department complaining of a swelling in the right inguinal region that he had first noted 1 year previously. For some time he had been aware of the increasing prominence of his abdomen. He also had complained of chronic cough, pains in the arms and legs, deafness, tremor, dizziness, weakness, insomnia, headache, nosebleeds, dyspnea, anorexia and swelling of the ankles. He was admitted to the medical ward, where anemia, slight icterus, ascites and splenomegaly suggested the diagnosis of hepatic cirrhosis; this was confirmed by peritoneoscopy. He lived for several months, during which repeated abdominal paracenteses were performed, and finally died in coma. Post-mortem examination was not performed.

The development of a large inguinal hernia caused this patient to come to the hospital, where the diagnosis of cirrhosis of the liver with ascites was established.

In addition to the cases described above, 3 patients have been observed in this clinic in whom hernias, which had appeared together with the

onset of ascites, later caused alarming new symptoms as a result of incarceration. In 2 cases, operations were withheld because of the poor condition of the patients; both recovered after a stormy illness. The third patient was operated on successfully.

COMMENT

The incidence of hernia is high in patients with hepatic cirrhosis and ascites, and at times symptoms referable to the hernia itself may first cause the patient to seek medical attention. Thus in the 4 cases reported above, the development of a hernia was the first indication of severe intra-hepatic disease, or at least of ascites; in 2 the ascites was discovered only during herniorrhaphy. Abdominal hernias have further significance in the life history of hepatic cirrhosis, since the not infrequent occurrence of incarceration creates a grave emergency in these patients.

It is unlikely that ascites in itself causes the development of hernia, for hernias were found in less than half the patients with large amounts of abdominal fluid studied by Chapman, Snell and Rowntree,¹ as well as in those observed here. Hernias previously present as latent defects probably enlarge as a result of the long-standing increase in intra-abdominal pressure due to the presence of ascites. Large amounts of abdominal fluid have the same significance in this regard as chronic cough.

The purpose of this communication is to call attention to the advisability of considering the diagnosis of hepatic disease with ascites in patients complaining of hernia.

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REFERENCE

1. Chapman, C. B., Snell, A. M. and Rowntree, L. G. Decompensated portal cirrhosis: report of one hundred and twelve cases. *J. A. M. A.* 97:237-244, 1931.

PRIMARY ADENOCARCINOMA OF THE JEJUNUM*

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IN the literature, references to primary adenocarcinoma of the jejunum are rather scarce, conforming to the low incidence of the disease in this portion of the bowel as compared with carcinoma of other parts of the gastrointestinal tract. Because of this infrequency, surgeons are less familiar with the lesion than with carcinoma at the more usual sites. Ewing,¹ in the recent edition of his book, devoted to this subject approximately one page of text and one illustration. "Marshall,"² in his excellent work on chronic diseases of the abdomen, dismisses the subject with one sentence, "Cancer of the small intestine constitutes 1 per cent of bowel cancers; it presents the classic ladder-pattern obstruction with empty cecum and occult blood in the feces." Mayo and Nettrour,³ from the largest series of cases from any single source found carcinoma of the small intestine to constitute but 0.47 per cent and of the jejunum 0.15 per cent of all carcinomas of the gastrointestinal tract.

Although the jejunum thus seems to be relatively immune from cancer, the patient is particularly unfortunate when it does occur. The impression is general, and supported by the experience of many, that treatment is usually unsatisfactory. Thus Mayo and Nettrour³ in the paper referred to above conclude with the words, "The operative mortality of carcinoma of the jejunum is 20 per cent, while the average duration of life is 17.6 months following operation." This opinion is supported by Medinger's⁴ analysis of 22 cases from Boston sources, of which 19 were treated by operation, with a mortality of 47 per cent, "of the survivals, 3 patients are living and well with no recurrence for periods of eleven years, three years and less than one year."

For the purpose of this paper we have considered 3 cases, 1 of which was treated jointly by the writers, and 2 by other members of the staff of the Worcester City Hospital. A review of the hospital records from 1921 to 1938 inclusive, during which 81,447 patients were admitted to the surgical department, reveals that 28,135 surgical specimens were examined in the laboratory, of which only 3 were reported as carcinoma of the

jejunum. In the same period 2266 autopsies were done; carcinomas of the gastrointestinal tract were found in 67, but none of these were primary in the jejunum. There were also 147 operative cases of histologically verified gastrointestinal carcinoma, of which 3, or 2.1 per cent, were of the jejunum.

Because our small experience seems to justify a slightly more optimistic attitude toward these lesions, and because we believe that by focusing the attention of clinicians on the condition improved results may follow its more reasonable recognition, we venture to report the following cases.

CASE REPORTS

CASE 1. G. M., a 58-year-old draftsman, was admitted to the Surgical Service, Worcester City Hospital, on March 14, 1928, complaining of constant dull epigastric pain of four months' duration, radiating to the right costal margin, at other times shooting posteriorly to the right scapula. Vomiting, not infrequently late at night or in early morning, produced a watery, greenish material sometimes exceeding the immediate fluid intake. Concurrently the patient lost 25 pounds. There was no history of jaundice, constipation or coffee grounds vomitus, but he stated that he had had 'indigestion' for a number of years.

Physical examination revealed a well developed and fairly well nourished, rational man, in no acute distress, who had a temperature of 99°F. The head, neck, ears, nose, throat, lymph nodes and chest were normal. The blood pressure was 105/85, the pulse was 104, and regular in rate and rhythm. The abdomen was tense, and the stomach distended with gas and fluid. The liver descended 1 cm. below the right costal margin and was slightly tender to palpation. There was an old healed right inguinal herniorrhaphy scar.

Examination of the blood showed a red cell count of 5,300,000 with a hemoglobin of 70 per cent, and a white cell count of 12,000. No blood serologic findings were recorded. The specific gravity of the urine was 1.025, it was acid, and no sugar or albumin was present.

On March 16, 1928, with the patient under ether anesthesia, Dr. Marsh operated and found an enormously distended stomach and duodenum. About 7 cm. distal to the duodenojejunal junction, a constricting growth was encountered. No nodules were felt in the liver or in the mesentery of the small bowel. The section bearing the neoplasm was resected, and the bowel continuity restored by an end-to-end anastomosis. The patient made an uneventful recovery and was discharged from the hospital on the 19th postoperative day.

The pathological report at the time was 'adenocarcinoma.' Although the gross specimen is no longer available the slides are on file and have recently been reviewed by Drs. Raymond H. Goodale and Shields Warren, who concur in the diagnosis.

*Courtesy of Dr. Arthur W. Marsh.

*Presented at the annual meeting of the New England Surgical Society, Poland Spring, Maine, September 28, 1940.

†Consulting surgeon, Worcester City Hospital, surgeon in chief, Fairbairn Hospital.

‡Graduate assistant, Medical Outpatient Department, Worcester City Hospital.

The patient is now alive, 12 years after operation.

CASE 2.* A 52-year-old Italian laborer was admitted to the Surgical Service, Worcester City Hospital, on February 6, 1933, complaining of the belching of gas and of constipation of 3 days' duration. He was well until 4 months before entry, when he was seized by a severe epigastric pain, which later settled about his umbilicus. This was followed by nausea and several bouts of vomiting. As the pain slowly abated he noted a great deal of gurgling of the bowels. Following this episode the pain had persisted more or less; he had been unable to eat solid foods, and his appetite had gradually waned. Constipation insidiously increased, so that just previous to admission he had experienced one movement every 3 or 4 days. There had been no hematemesis, melena, jaundice or clay-colored stools. The weight had remained remarkably constant. The past and family histories were noncontributory.

Physical examination revealed a well-developed and well-nourished man in no distress. The temperature and respirations were normal. The blood pressure was 156/76. The pulse was 88, regular in rate and rhythm. The abdomen was distended, especially in the lower half. There was no spasm, rigidity, tenderness or palpable masses. Borborygmi were definitely auscultable.

Examination of the blood showed a white-cell count of 12,200, and a red-cell count of 5,100,000 with a hemoglobin of 80 per cent (Tallqvist). The urine was dark in color, with a specific gravity of 1.023 and no sugar or albumin. The blood Wassermann and Kahn tests were negative. The blood alkali reserve was 60.2 vol. per cent, the sugar 80 mg. per 100 cc., the nonprotein nitrogen 35.3 mg., the icteric index 12, and the van den Bergh test negative.

The x-ray report was as follows: "The stomach and duodenum are normal. At 6 hours the stomach is empty, the head of the meal is at the hepatic flexure. The jejunum shows several much-dilated coils. At 24 hours the dilated jejunum is still prominent. Diagnosis: obstruction of small intestine; etiology uncertain (adhesions?)."

On February 10, under ether anesthesia, Dr. A. W. Boyden opened the abdomen and encountered a distended jejunum. A hard constricting mass about the size of an ordinary hen's egg, indented on the mesenteric side, was found and resected with about 15 cm. of the intestine. An end-to-end anastomosis was performed, and the wound closed. Recovery was smooth, and the patient was discharged on the 21st hospital day.

The resected portion, when split, showed a hard mass intruding into the lumen of the intestine and occluding it except for a space on the antimesenteric side barely sufficient to admit the tip of the little finger.

The pathological report was as follows: "Gross examination shows a piece of intestine measuring 10 cm. in length containing a polypoid tumor mass measuring 3 by 2.5 by 3 cm., and a second tumor mass at the same level measuring 2.5 by 3 by 2 cm. The surfaces of these tumors are made up of small papillary projections. Sections reveal adenocarcinoma of the jejunum of low malignancy."

The patient has been followed and is now, 7½ years later, working full time at his usual employment.

CASE 3. A 76-year-old Syrian priest was first seen professionally by one of us (E. L. H.) on September 8, 1936, because he had discovered a lump in his abdomen. For

years he had suffered from indigestion, for which he had taken bicarbonate of soda with more or less relief. He was an inveterate smoker of cigarettes, was rather abstemious in diet, and used alcohol sparingly. About 3 weeks before seeking advice he had been seized by a sharp epigastric pain while celebrating Mass. This eased somewhat in 15 minutes but persisted for 8 to 10 hours and left him weakened for 2 or 3 days. Examination of the abdomen revealed a lax and thin abdominal wall with a visible prominence at the left of the navel. A well-defined ovoid mass, seemingly the size of a lemon, could be readily felt, and was freely movable, slipping under the hand like a floating kidney. It was nontender, and there was no evidence of gas-pocketing near it. No blood had been observed in the stools.

The patient was referred for x-ray study of the colon, with a tentative diagnosis of cyst of the mesentery. The report was as follows:

A flat film of the abdomen taken before injection of the barium shows the kidney outlines fairly well on both sides. They appear normal in position and outline. A soft-tissue mass is visible just below the shadow of the left kidney, which corresponds to the area of the mass in the abdomen.

There is no delay in the filling of the colon, and no definite filling defects are noticed. The mass in the left lower quadrant can be moved independently of the colon. There is no sign of intrinsic disease of the colon.

On the chance that this might represent a mass in the stomach, a small drink of barium was administered, but the stomach also is entirely separate from the mass. The course of the barium could not be followed down through the small intestine because of the fairly large amount of barium retained in the colon following evacuation.

The following week, again while celebrating Mass, the patient was overcome by another attack of epigastric pain, which persisted until the next day. He entered the Worcester City Hospital on September 27, where physical examination revealed a well-developed, fairly well-nourished aged white man in no acute distress. There were a few crackling rales at the lung bases. The heart sounds were of fair quality and regular in rate and rhythm; a soft systolic murmur was heard over the aortic area. The blood pressure was 128/80. The white-cell count was 16,700, and the red-cell count 4,120,000 with a hemoglobin of 85 per cent. The urine showed a very slight trace of albumin and a trace of sugar. No serologic examination of the blood was made.

At operation on September 28 by one of us (E. L. H.) under spinal anesthesia, the abdomen was opened through an oblique incision on the left side. A large movable ovoid mass covered with adherent omentum was encountered and delivered into the wound. The omentum was divided, and the true character of the growth revealed. It was an ovoid mass 10 by 8 cm., involving a loop of jejunum in two places, with a loop about 30 cm. in length between the two attachments. There were numerous enlarged lymph nodes in the adjacent mesentery. No nodules could be felt in the liver. The intestine was divided between clamps about 15 cm. above and below the attachments of the growth, and resected with a correspondingly large section of the mesentery, including the enlarged lymph nodes. Repair was made by end-to-end anastomosis and suture of the mesentery. The incision was closed without drainage.

*Courtesy of Dr. Everett P. Jewett.

The pathological report by Dr. R. H. Goodale was as follows:

Gross examination shows 50 cm. of small intestine attached to a cystic mass 10 cm. in diameter (Fig. 1). The wall of the cyst measures 2 cm. in thickness. The center is filled with mucopurulent material. The intestine is adherent to the mass 10 cm. from the resected end. Near the other end there is a fistulous communication with the mass, at which point the intestine is flattened out over the surface of the cyst. The cyst wall is soft and cuts with ease.

Sections show islands of epithelial cells in a dense connective-tissue stroma (Fig. 2). The cells show moderate variation in size and staining quality.

loom large against the background of general clinical experience, early recognition and prompt and efficient treatment are of vital consequence to the patient. It should therefore be kept well in mind when one is confronted by a gastrointestinal problem.

The average of patients having this disease is stated by Ewing² as 46.5 years. In Rankin and Mayo's⁶ series of 55 cases, it was 47.5 years, whereas Mayo and Nettrour³ obtained an average of 51.0 years. Stein,⁶ in his group of 8 cases, reported an average of 47.5 years. Our 3 cases gave an

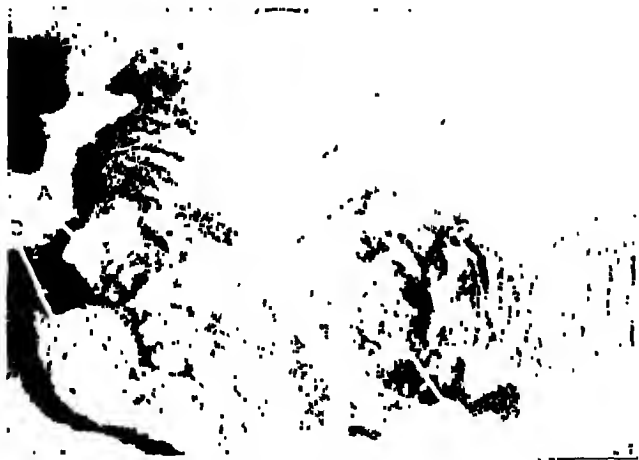


FIGURE 1. Case 3.

Photograph of gross specimen. A = dense constricting growth; B = narrowed lumen; C = softened area; D = area from which section was taken. (Photograph by M. D. Carrigan.)

There are numerous mitotic figures and definite gland formation.

Diagnosis: adenocarcinoma of jejunum (medium malignancy).

The postoperative course was uneventful except for a chill following an intravenous injection of glucose solution on the second day, and a small collection of serum in the upper end of the incision. The patient was discharged on the 14th day.

The patient remained at home for the most part. He had a chronic cough and lacked strength. His bowels functioned well, but his appetite remained poor. In March, 1938, he developed a severe persistent pain in the left thigh. It had the character of a referred pain, and x-ray films of the pelvis were taken but revealed no cause for the symptom. Later the femur showed apparent thickening, and x-ray films showed the shaft extensively involved (Fig. 3). X-ray therapy was administered without notable relief. The patient succumbed on January 27, 1939, of cachexia, 2 years and 4 months after operation.

Although carcinoma of the jejunum does not

average of 62 years, and all occurred in men. The literature shows a preponderance of men over women in a ratio of 2:1.

The malady bears no distinctive hallmark. Its manifestations and clinical course are influenced by the type of local growth, which may be polypoid, ulcerative, sclerosing, excentric or annular, or any combination of these characteristics. Symptoms of a general nature may be those first noticed by the patient, among which weakness and fatigability are most frequent, and may be associated with anemia of mild or considerable degree. Indigestion and anorexia are usually experienced and may be associated with weight loss. Fortunate is the patient whose doctor at this point is aware of the possibilities involved and insists on a complete diagnostic study. The presence of occult blood in the feces after exclusion of oxidase-contain-

ing foods indicates the strong probability of an organic lesion somewhere in the digestive tract.

"Indigestion" takes the form of intermittent cramps near or below the navel and is associated with rumblings and borborygmi, which may come such a considerable time after eating that the patient does not associate them with the taking of food. Constipation is usual, but lacks the alternation with diarrhea common to large-bowel tumors.



FIGURE 2. Case 3.

Low-power photograph of a section, showing the adenomatous structure and dense connective tissue. (Photograph by M. D. Carrigan.)

Vomiting depends on the degree of obstruction and the height of the lesion. It may be absent, slight or severe, and may occur intermittently in association with other manifestations of obstructive attacks. Salivation and frequent vomiting of copious amounts of fluid should at once suggest this lesion. Hemorrhage sufficient to be recognized as hematemesis or melena may occur, but commonly does not. Loss of weight and secondary anemia may be considerable. X-ray studies may reveal retardation of the passage of barium and dilatation of the jejunum (or duodenum) above the lesion; the dilated portion is identified as the jejunum by its deep circumferential folds (Kerkring's). Flat films for gas reveal the typical ladder pattern according to the degree and site of the obstruction. Physical examination shows gas-filled loops, with visible peristalsis accompanied by cramps and borborygmi. Palpable tumor, when present, is significant and usually slips about under pressure of the hand.

Episodes of acute obstruction with pain, distention and vomiting are commoner with the polypoid forms, which may also cause intussusception.

TREATMENT

All authorities agree that timely and adequate operation is the only means for approximating

a cure. Wide resection with re-establishment of continuity of bowel by end-to-end, side-to-side or end-to-side anastomosis is the object to be attained. When there is a combination of suggestive symptoms, such as intermittent pain, secondary anemia, distention and vomiting with the presence of occult blood in the stool, even if x-ray studies have failed to establish a diagnosis, exploration is justifiable. Hodgkins's⁷ advice to go at once to the areas most commonly the seat of cancers of the small intestine, namely, the upper jejunum and the lower ileum, is worth remembering, to minimize operative trauma.

Recent years have brought valuable contributions to the methods for dealing with intestinal obstruction from any cause. One should mention supportive measures directed toward restora-



FIGURE 3. Case 3.

Photograph of x-ray film, showing extensive metastatic involvement of the femur.

tion of physiologic requirements of tissue fluids, electrolytes, carbohydrates and blood-protein (transfusion) by the parenteral route. Decompression by Miller-Abbott or Wangenstein intubation methods has contributed much toward lowering mortality rates and supplanting enterostomy. Improved technics of resection, including the aseptic methods of Rankin and Mayo⁵ and others, lessen the dangers of the procedure. Since the majority of jejunal cancers lie near the proximal end of that bowel segment, the methods of duodenojejunal anastomosis devised by Rankin⁵ and by Lahey⁸ enlarge the possibilities of radical removal. The physical equipment and technical skill for

all these procedures are indispensable to success in dealing with the disease.

SUMMARY

Experience with three cases of carcinoma of the jejunum is presented.

There was no operative mortality.

There was postoperative survival without present evidence of disease of eleven years and eight years in two cases, whereas the third patient, an aged man, succumbed from metastatic lesions in two years and four months.

Hope for improvement in the results of treating this rare condition is based on the improved diag-

nostic, supportive and operative procedures now available.

REFERENCES

1. Ewing, J. *Neoplastic Diseases: A treatise on tumors*. Fourth edition 1160 pp. Philadelphia, W. B. Saunders Co., 1940 P. 722
2. Marshall, C. J. *Chronic Diseases of the Abdomen. A diagnostic system*. 247 pp. Boston, Little, Brown & Co., 1939. P. 131
3. Mayo, C. W. and Kettner, W. S. Carcinoma of the jejunum *Surg., Gynec. & Obst.* 65:303-309, 1937.
4. Medinger, F. G. Malignant tumors of the small intestine: study of their incidence and diagnostic characteristics. *Surg., Gynec. & Obst.* 62:299-305, 1939.
5. Rankin, F. W. and Mayo, C. 2nd. Carcinoma of the small bowel *Surg., Gynec. & Obst.* 1:939-947, 1930
6. Stein, J. J. Tumors of the small intestine, a review of the literature and report of eight additional cases. *Am. J. Digest Dis. & Nutrition* 4:517-522, 1937.
7. Hodgkins, E. M. Primary carcinoma of the jejunum with report of two cases. *New Eng. J. Med.* 214:477-480, 1936
8. Laker, F. H. A new plan of anticolic duodenojejunal anastomosis. *Surg., Gynec. & Obst.* 70:689-691, 1940.

TRICHINOSIS

Report of a Case, With Demonstration of the Larva in the Arterial Blood*

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THE development of complex refinements in laboratory technic has been accompanied by a neglect of older, simpler and yet important methods of laboratory diagnosis. This has evidently occurred in trichinosis, since little mention is ever made of examination of the blood for the larva of *Trichinella spiralis*.

Isolation of the larva of *T. spiralis* from the human blood stream was first accomplished by Herrick and Janevay¹ in 1909. In their case, the larvae were recovered on the twenty-third and twenty-fifth days after the ingestion of infested pork. Their method consisted of laking venous blood with 15 volumes of 3 per cent acetic acid, centrifugalizing and examining the sediment.

Since the patient is usually seen when the symptoms are those that occur during the period of dissemination of the larvae,—puffiness of the eyelids, conjunctivitis, fever and muscle pains,—the laboratory diagnosis should be most readily established by isolating the *T. spiralis* larva from the blood stream. Usually at that time, the suspected meat is not available for examination, and it is too late to recover the dead adult male worms from the feces. Permission for muscle biopsy is not always obtainable, and when it is performed does not always contribute to the presumptive diagnosis.² With two possible exceptions, an early positive diagnosis of trichinosis cannot be made without demonstrating the larval or adult stage of the causative organism. These exceptions are

a positive precipitin test and a positive skin test. The precipitin titer may be elevated during the period of dissemination, a circumstance that occurred in the case to be presented. Precipitin titers rising during the course of illness and convalescence permit a positive diagnosis of trichinosis. Using the skin test, a positive diagnosis can be made only if an initial negative intradermal reaction is followed by a positive one, or if a delayed positive reaction is followed by an immediate positive one.³ An immediate positive skin test does not permit a positive diagnosis, since such a reaction has been shown to persist for at least three years after an attack of trichinosis.⁴ However, should the patient be seen early during the period of dissemination, neither of these tests may be positive. A clinically typical case during an epidemic and the presence of eosinophilia, although very suggestive, still permit only a presumptive diagnosis of trichinosis. Therefore, because of the time at which the patient is usually seen, and because of the usual train of immunologic events, isolation of the larva of *T. spiralis* offers the earliest means of making a positive diagnosis of trichinosis.

Since the literature on general and specific aspects of trichinosis has recently been admirably covered,^{2,4} no further review is warranted.

The following case is presented to illustrate the value of examination of the blood for the larva of *T. spiralis*, with a modification of the original procedure, namely, the use of arterial blood, and to call attention to an unusual but important find-

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ing, namely, the development of typhoid H and O agglutinins during the course of illness.

CASE REPORT

E. E. K. (P. B. B. H. No. 115298) was a 38-year-old German-born butler who entered the hospital on May 28, 1940, because of burning and puffiness of the eyes of 5 days' duration, together with fever and malaise of 2 days' duration. The patient had never had typhoid fever and he had never received prophylactic inoculations for that disease. He had had psoriasis, limited to the elbows and knees for as long as he could remember.

On May 7, 1940, and for several days thereafter, the patient was said to have partaken, with several other members of the household, of some imported smoked ham. Preparation of the ham before eating did not include heating in any manner. On May 23, 16 days after first ingestion of the smoked ham, the patient's initial symptoms appeared. He complained of low frontal headache, swelling of the upper eyelids, and redness and burning of the eyes. By the following day, the swelling of the upper lids had receded slightly, but swelling of the lower lids appeared. On May 25, the patient noted dizziness and malaise. The next day he felt too ill to rise. He was found to have an oral temperature of 100°F., and the same night he had a shaking chill. On May 27, the day before admission, the patient complained of severe aching pains in the gastrocnemius muscles. The palpebral edema had subsided somewhat.

That the patient's contact with trichinous meat occurred on May 7 is confirmed by the facts that three other members of the household developed symptoms of trichinosis—puffiness of the eyes, muscle pains and fever—on or after May 14 and that the patient had eaten no pork subsequent to May 9.

On admission to the hospital the patient appeared severely ill. The temperature was 103°F., and the pulse 96. The skin was hot and moist. Over the elbows and knees were the erythematous, silver, scaled lesions of psoriasis. There were no subungual splinter hemorrhages. Chemosis and marked injection of the bulbar conjunctivas were present; in the left fundus there was a small fresh hemorrhage. The tongue was reddened, and the tip was tender. The lungs were clear, and examination of the heart revealed no abnormalities other than an apical systolic murmur. The blood pressure was 124/80. There was no abdominal tenderness. In the left axilla, there were several enlarged, palpable lymph nodes. The forearms and lower legs were tender to palpation. Neurologic examination was negative.

The blood showed a white-cell count of 7300, with 15 per cent eosinophils; the red-cell count was 5,800,000, with a hemoglobin of 110 per cent (Sahli) and a hematocrit of 42 per cent. The sedimentation rate was distinctly elevated—34 mm. per hour (Wintrobe). The urine showed occasional erythrocytes in the sediment. The urine was examined for larvae, and the stools for the adult males, but *T. spiralis* could not be recovered in either form. The serum-phosphatase test showed a normal value of 3 Bodansky units per 100 cc. The blood Wassermann and Hinton tests were negative.

Since conjunctivitis, chemosis, palpebral edema, muscle pains and tenderness were present, the patient was considered to be in the stage of larval dissemination. On May 29, 5 cc. of venous blood was laked with 15 volumes of 3 per cent acetic acid, the specimen centrifugalized and the sediment examined. No larvae were

found. Because of their route of propagation the larvae were searched for in the capillary blood on the following day, with negative results. On May 30, 5 cc. of blood was removed from the brachial artery and prepared as described above, and from this preparation larvae of *T. spiralis* were recovered (Fig. 1).

The patient's course and laboratory studies are summarized in Figure 2. For 6 days after admission, the fever was of a high-grade, remittent type, and the temperature did not return to normal until the 11th hospital day. The palpebral edema was absent after the 4th, and the muscle aches subsided after the 5th hospital day.

A chest film taken on May 29 showed slight exaggeration of the lung markings but no localized involvement. An electrocardiogram taken on May 31 showed normal tracings. Muscle biopsy was not performed. Stool and urine cultures revealed no pathogenic bacteria. Skin tests, using the National Institute of Health trichina antigen in a 1:10,000 dilution, were performed on May 29, June 4 and July 10, with results as indicated in Figure 2.



FIGURE 1. Photomicrograph of the Migratory Form of the Larva of *Trichinella spiralis*.

A = anterior valved hyaline cap; B = oblique hyaline band (Stäubli?); C = leukocytes.

Trichina precipitin tests, performed at the National Institute of Health, showed the highest titer (1:1280) with serums of May 29 and June 4. The eosinophilia reached 45 per cent on June 2, and 1 month after discharge had fallen to 6 per cent. No agglutinins for typhoid H (formalin-killed) antigen or typhoid O antigen were present initially, but by July 10 agglutinins were present in serum dilutions of 1:640 and 1:1280, respectively. Serums obtained on four occasions were tested for proteus OX₁₀ agglutinins; the initial titer was low and remained essentially unchanged.

Examination of the arterial blood for the migratory larval form of *T. spiralis* provided a simple, rapid method for early laboratory diagnosis in this case. It also rendered unnecessary a muscle biopsy, which is more expensive and time consuming.

Because of a difference of opinion concerning the size and morphology of the migratory form of the larva of *T. spiralis*,^{5, 6} a detailed description is warranted at this time. One of the better descriptions is to be found in Stäubli's⁷ monograph. The migrating larva is said to measure 80 to 120 microns in length, and 6 microns in width. The

specimen shown in Figure 1 measured 115 by 5 microns. Anteriorly, a valved hyaline cap (*A*) is situated, and separating the anterior fourth from the posterior three fourths of the body, there is an oblique hyaline band (*B*).⁷ The remainder of the body is granular in appearance. These features are readily demonstrable with Wright's stain.

An unusual feature in this case was the development of agglutinins in high titer for typhoid *H* (formalin killed) and *O* antigens. It is sig-

nificant here because there was no antecedent history of typhoid fever, and because the patient had received no prophylactic typhoid inoculations. The presence of typhoid agglutinins in trichinosis was reported by Maase and Zondek⁸ in 1917. In 3 cases of trichinosis proved at autopsy, typhoid agglutinins were present in serum dilutions of 1:400, using a live antigen. There was no agglutination demonstrable, however, when a killed typhoid antigen was used. In none of the cases was there a history of typhoid fever or of prophylactic inoculation, nor were the lesions of typhoid fever demonstrable at autopsy. Conner⁹ reported 2 patients with trichinosis who developed typhoid agglutinins after recovery. In one of these, the presence of typhoid agglutinins was transient, in the other, repeated tests were positive—on one occasion in

a dilution of 1:2560. It is difficult to assess the significance of typhoid agglutinins in trichinosis, and further search for the presence of a common antigen is to be carried out.

Weil-Felix tests, using proteus OX₁₉, were performed because the clinical picture of trichinosis may resemble that of typhus or Rocky Mountain spotted fever, and because a positive reaction of no immediate significance might be detected, as the one that occurred with the typhoid agglutina-

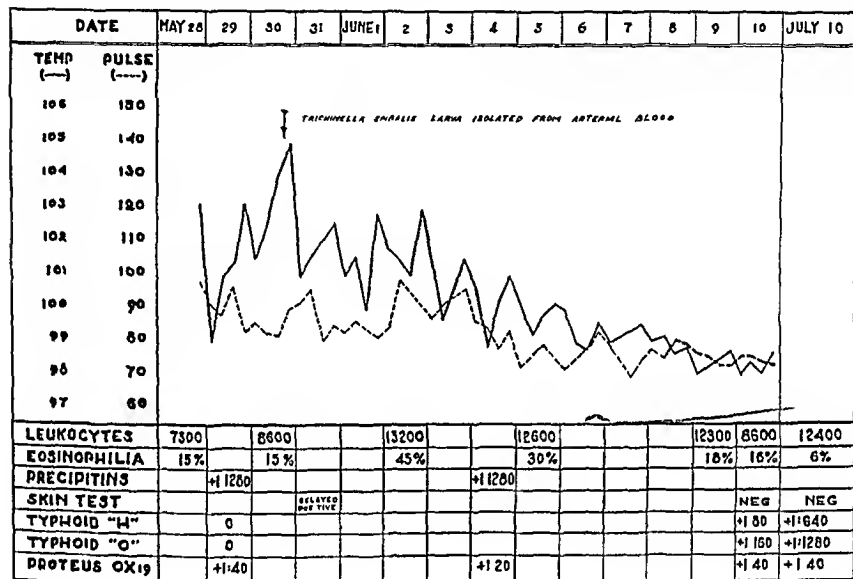


FIGURE 2

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trichinosis. However, agglutination occurred in no serum dilution higher than 1:40, which titer can be found in 21 per cent of routine serums.¹⁰

Another unusual feature in this case was the presence, relatively late in the course of illness, of a delayed positive skin reaction, which was followed by two negative reactions, the latter of the two tests being performed with as much as 0.1 cc of the National Institute of Health trichina antigen (1:10,000). This is at variance with the findings of Spink,³ who noted that delayed positive skin reactions were invariably followed by immediate positive reactions.

SUMMARY

A case of trichinosis is presented in which the larva of *Trichinella spiralis* was recovered from

arterial blood after unsuccessful examination of venous and capillary blood. The examination of arterial blood is suggested as a modification of the original technic of Herrick and Janeway.¹

Because of the simplicity of the method and its value in early laboratory diagnosis of trichinosis, examination of arterial blood is considered a useful procedure.

During the course of observation, agglutinins to typhoid H (formalin-killed) antigen and typhoid O antigen developed from initial titers of zero to agglutinations in serum dilutions of 1:640 and 1:1280, respectively.

The initial skin reaction to National Institute of Health trichina antigen (1:10,000) was of the delayed positive type. This was followed by two

negative reactions, the latter of which was performed two months after exposure.

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REFERENCES

1. Herrick, W. W. and Janeway, T. C. Demonstration of the *Trichinella spiralis* in the circulating blood in man. *Arch. Int. Med.* 3:263-266, 1909.
2. Kaufman, R. E. Trichiniasis: clinical considerations. *Ann. Int. Med.* 13:1431-1460, 1940.
3. Spink, W. W. *Trichinella* antigen: further observations on its use in the diagnosis of trichinosis. *New Eng. J. Med.* 216:5-8, 1937.
4. Warren, M., Drake, E. H. and Hawkes, R. S. Some observations on the persistence of the Bachman skin test and of eosinophilia after recovery from trichinosis. *Ann. Int. Med.* 13:2141-2146, 1940.
5. Weiss, M. Trichinosis: recent observations. *New York State J. Med.* 29:1113-1116, 1929.
6. Murphy, F. D., James, H. D. and Rastetter, J. W. Trichinosis: a study of twenty-three cases. *Am. J. M. Sc.* 199:328-338, 1940.
7. Stäubli, C. *Trichinosis*. 295 pp. Wiesbaden: J. F. Bergmann, 1939. P. 31 and Plate V.
8. Maase, C. and Zondek, H. Bemerkenswerte Befunde bei Trichinose. *München. med. Wchnschr.* 64:968, 1917.
9. Conner, L. A. Atypical clinical forms of trichiniasis. *Ann. Int. Med.* 3:353-359, 1929.
10. Savoor, R., Castaneda, M. R. and Zinsser, H. Notes on the Weil-Felix reaction in individuals not suffering from typhus. *Proc. Soc. Exper. Biol. & Med.* 33:365, 1935.

CLINICAL NOTE

THE VALUE OF VITAMIN K IN THE TREATMENT OF ABNORMAL BLEEDING*

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IN THE last year or two so much attention has been drawn to the subject of prothrombin deficiency and therapy with vitamin K in cases of abnormal bleeding that the presentation of such a case occurring in urologic practice seems timely.

CASE REPORT

A 21-year-old man entered the hospital because of repeated attacks of pain in the right kidney region accompanied by hematuria. X-ray examination showed a stone, the size of a lima bean, in the kidney at the ureteropelvic junction. The past history revealed nothing abnormal. The patient had always been healthy. He had undergone tonsillectomy uneventfully 9 years before. He had never had any abnormal bleeding, nor was there any family history of such bleeding. Physical examination revealed a healthy-appearing young man. Neither spleen nor liver was palpable, nor were there any abnormal lymph nodes. The blood-cell counts and smear were not abnormal. A blood Hinton test was negative. The only abnormal finding was a systolic blood pressure of 150, which was probably due to preoperative excitement, since the diastolic pressure was only 70. Pyelolithotomy under ether anesthesia was carried out uneventfully. A small incision was made in a good-sized extrarenal pelvis, and the stone was easily removed. The incision in the pelvis was sutured loosely with two stitches, and the wound was closed in the usual manner, with drainage. At no time was the parenchyma of the kidney wounded. The immediate convalescence was very satisfactory, with no abnormal bleeding.

By the 4th postoperative day, the temperature was down

to normal, the wound was draining only a little urine, and that voided was fairly clear. On the 5th and 6th postoperative days the patient began to run a slight evening fever and to have some blood in the urine. On the 7th day the temperature suddenly went up to 103°F., the pulse to 125, and the urine began to be grossly bloody, with long wormlike clots, apparently casts of the ureter. Simultaneously, bleeding began from the wound, good-sized clots coming out through the drainage sinus. Thus it appeared that there was bleeding not only from the interior of the kidney into the urine, but also from outside the kidney. Since by this time the urine had stopped leaking out through the wound, and since there was thus apparently no connection between the inside of the kidney and the wound, it was extremely puzzling to imagine what could cause bleeding from both inside and outside the kidney, especially since the parenchyma of the kidney had not been wounded at operation. For the next 4 days moderately profuse bleeding continued both in the urine and from the wound. On the chance that there was some abnormality of the bleeding or clotting mechanism, studies of these were made, and it was found that, whereas, the bleeding time was normal (2½ minutes), the clotting time in five tubes was 27 minutes in the first three and 39 minutes in the others. This abnormality was definite evidence of prothrombin deficiency. Unfortunately—because it was Saturday—a prothrombin determination could not be done that evening. The patient was immediately given a blood transfusion and 6000 Almquist units of vitamin K by mouth. By the next morning, both the intrarenal and extrarenal bleeding had decreased somewhat, and the pulse and temperature, which had been elevated ever since the bleeding had started, had gone down almost to normal. By Monday morning—36 hours later—the clotting time was approaching normal—7 minutes in the first tube and 13 minutes in the others; the prothrombin time was essentially normal, being 18 seconds (normal, 19 seconds). By the next day the clotting time was 6 minutes in the first tube and 11 minutes in the others. During the course of the next few days the patient received 2000 units of vitamin K by mouth daily, and the intrarenal and extrarenal bleeding gradually ceased. When he left the hospital on the 26th postoperative day, the urine contained only a rare red blood cell, and the wound was draining only a very small amount of clear serum.

*Presented at a meeting of the New England Section of the American Urological Association, Boston, May 2, 1940.

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One thinks of reduction of prothrombin with abnormal bleeding as occurring especially in cases with jaundice and liver damage, and in such conditions as cirrhosis of the liver, the cachexia of cancer, chronic loss of blood, peptic ulcer, chronic sepsis, malnutrition and avitaminosis. However, this patient was a vigorous appearing young man, apparently enjoying the best of health, except for the attacks of pain and hematuria due to the kidney stone. He had not been jaundiced and gave no history of abnormal bleeding. Therefore, the discovery of this condition was a complete surprise, and made me wonder if I had in the past occasionally encountered cases of abnormal bleeding similarly due to prothrombin deficiency that

I had failed to recognize as such. In retrospect, a few patients who bled longer and more persistently than normal may well have been deficient in prothrombin. In such operations as nephrolithotomy, prostatectomy and even transurethral prostatic resection, the surgeon cannot ligate all the bleeding points and must of necessity depend a good deal on the natural blood-clotting mechanism of the body. Therefore I believe that this subject is of particular interest to urologic surgeons, especially because the introduction of prothrombin determinations and vitamin K therapy has made diagnosis and treatment simple and satisfactory.

352 Marlboro Street

MASSACHUSETTS MEDICAL SOCIETY

PROCEEDINGS OF THE COUNCIL

Stated Meeting, February 5, 1941

A STATED meeting of the Council of the Massachusetts Medical Society was held in John Ware Hall, Boston Medical Library, 8 Fenway, Boston, on Wednesday, February 5. The meeting was called to order at 10:30 a.m. by the president, Dr. Walter G. Phippen, Essex South, 209 councilors were present (Appendix No. 1).

The Secretary *pro tempore* presented the record of the meeting of the Council of October 2, 1940, as published in the *New England Journal of Medicine*, issue of October 31. Following a vote, the President declared the record approved as published.

The following obituary of a councilor who had died since the last meeting was read by the President:

DR. EDWARD MELLUS, of Newton, died December 7, in his sixty-ninth year.

Born in Zumbrota, Minnesota, he attended Harvard College, and received his degree from the Harvard Medical School in 1903. He was a member of the Newton Board of Health, a member of the staff of the Newton Hospital, a former member of the Newton City Planning Board, and a member of the New England Society of Psychiatry. At the time of his death he was treasurer of the Middlesex South District Medical Society.

Dr. Mellus maintained a sanatorium in Newton until 1929, when he retired from active practice.

Two sons and a daughter survive him.

The Council stood in silent tribute to the memory of Dr. Mellus.

The report of the Auditing Committee (Appendix No. 2), signed by Drs. Edwin B. Dunphy and Henry W. Hudson, Jr., was read by the treasurer,

Dr. Charles S. Butler. It was voted to accept the report as presented.

The report of the Treasurer (Appendix No. 3) was presented by him and was duly accepted.

REPORTS OF STANDING COMMITTEES

Membership

The chairman, Dr. G. Colket Caner, Suffolk, presented the report (Appendix No. 4), which was accepted. The first six items, recommending that sixteen fellows be allowed to retire, one fellow be nominated for affiliate fellowship in the American Medical Association, twelve fellows be allowed to resign, six fellows be allowed to have their dues remitted, forty-eight fellows be deprived of fellowship because of nonpayment of dues and six fellows be allowed to change their districts without change of legal residence, were approved. The seventh item, recommending that the dues of fellows called to active service in the United States Army, Navy or Public Health Service be remitted, subject to certain limitations, was accepted.

Financial Planning and Budget

The report (Appendix No. 5) was presented by the chairman, Dr. John Homans, Suffolk. It consisted of the recommendations for the budget for 1941, and copies had already been distributed to all councilors. Dr. Homans explained that the amounts specified for the Executive Assistant, Executive Secretary and Secretary were suggestions, since the status of these officers depended

on subsequent action by the Council; however, the total amount recommended was adequate to cover any contingency. Following a short discussion, the budget was approved.

Ethics and Discipline

The chairman, Dr. Robert L. DeNormandie, presented the report (Appendix No. 6). Dr. David Cheever, Suffolk, commented on the committee's request for advice in regard to whether the committee should give more publicity to the complaints brought before it. The lack of further discussion was tacit approval of the committee's policy in handling these matters. The report and recommendation were accepted.

Medical Education and Diplomas

The first part of the report (Appendix No. 7) was presented by the chairman, Dr. John P. Monks, Suffolk. Dr. Monks stated that he preferred to have the recommendations considered in two parts—the first having to do with the application for fellowship of graduates of unapproved and foreign medical schools, and the second with the reapplication for fellowship of members who had resigned at the request of the Committee on Ethics and Discipline. Dr. Reginald Fitz, Suffolk, suggested that the matter should be deferred until the Council was better informed in regard to the recommended changes.

In a general discussion that followed, the question whether the proposed changes in the by-laws had been properly presented to the Council was argued. The President ruled that they had not "been submitted previously in writing to the Council," and hence that no action could be taken. It was eventually moved by Dr. Cheever that a special meeting of the Council be called for the specific business of considering these matters after the circulation of additional information. The motion was seconded and passed.

Dr. Monks then read the second part of the report, and the President ruled that these recommended changes in the by-laws should also be considered at the special meeting.

State and National Legislation

The chairman, Dr. Henry C. Marble, Suffolk, presented the report (Appendix No. 8). A motion to accept the report was made and seconded, and the matter opened for discussion.

Dr. Michael A. Tighe, Middlesex North, commented on the charge by the Board of Registration in Medicine that the Society had done nothing to improve the archaic medical practice act, adding that it was largely through the efforts of the Society and its officers, rather than those of the Board, that the so-called "Educational Bill," which

created the Approving Authority, was passed in 1936. Dr. Tighe stated that the limiting date of the act had already been postponed for two years and that now a bill has been filed to postpone once again the effective date. The latter was confirmed by Dr. Marble.

Dr. Brainard F. Conley, Middlesex South, said that the Society had always been ready to cooperate with the Board, but that it had never been asked to do so. When the Society offered to help the Board to obtain adequate funds, he added, this help was refused and the bill for annual registration followed. Dr. Conley stated that, in his opinion, any committee or commission to investigate surgery should be appointed by the Society rather than by the Legislature and the Governor. And he corroborated Dr. Tighe's statement to the effect that the passage of the Approving Authority Bill was chiefly owing to the efforts of the Society and its president, Dr. Charles E. Mongan.

Dr. Tighe questioned Dr. Marble as to the attitude of the Board to the bill postponing the effective date of the Approving Authority. Dr. Marble replied that he did not know.

The President asked for a vote of acceptance of the report of the committee; it was so voted.

The first recommendation—the appointment of a committee by the President to investigate the practice of medicine in the Commonwealth—was duly adopted.

After some discussion, no motion was made to adopt the second recommendation,—the appointment of a committee by the President to consider the practice of surgery and the matter of restricted licensure,—and the President declared the matter dropped.

Dr. Tighe moved that the committee be instructed to oppose Bill 611, which would permit extension of the effective date of the Approving Authority. The motion was seconded and duly passed.

No reports were made by the Committee of Arrangements, the Committee on Publications, the Committee on Public Health, the Committee on Medical Defense and the Committee on Permanent Home.

REPORTS OF SPECIAL COMMITTEES

Cancer

The chairman, Dr. Shields Warren, Suffolk, presented the report (Appendix No. 9), which was accepted.

Public Relations

The report (Appendix No. 10) was presented by the secretary, Dr. Elmer S. Bagnall, Essex

North, who moved its acceptance, which was duly seconded. Dr. James H. Townsend, Middlesex South, asked for an explanation of the essential points of difference between the enabling act sponsored by the Society and the bill proposed by the supporters of Health Service, Incorporated. At the request of the President, Dr. Thomas H. Lanman, Suffolk, chairman of the special committee to promote a medical costs insurance plan, replied that there were only two essential points of difference: first, the Society's bill permits the participation of all physicians licensed to practice, whereas the other bill limits the qualifications of participating physicians, and, secondly, the Society's bill places control under the supervision of the Commissioner of Insurance, whereas the other bill designates the Commissioner of Public Health as the supervising agent. The report was accepted.

Postgraduate Instruction

The report (Appendix No. 11) was presented by the chairman, Dr. Frank R. Ober, Suffolk. The report and the two recommendations were accepted.

Industrial Health

The report (Appendix No. 12) was read by the Secretary *pro tempore* and was accepted.

Army Medical Library and Museum

The report (Appendix No. 13) was read by the Secretary *pro tempore* and was accepted.

At 1:05 the President declared a recess, during which the Cotting Luncheon was served. The Council reconvened at 1:45 p.m.

Examination of WPA Records

The chairman, Dr. Guy L. Richardson, presented the report (Appendix No. 14), which was accepted.

To Consider New Officers and By-Laws

The chairman, Dr. Homans, referred to the report of the committee (Appendix No. 15), which was published in the January 16 issue of the *Journal* and copies of which had been forwarded to each councilor. He requested that the report be considered in two parts: first, that dealing with the offices of president-elect and executive secretary and, second, that concerning other suggested changes. Dr. Homans then explained in some detail the duties of the proposed executive secretary, and added that the matter of president-elect was probably less controversial.

Dr. David L. Lionberger, Norfolk, commented on the committee's admission, in regard to the second part of the report, that the committee was not representative. Since, in his opinion, the mat-

ter of redistricting the Society is of utmost importance and since the first part of the report is more or less dependent on the second, he offered the following motion:

That the committee report be accepted as one of progress and that the committee be kept intact, and that the entire matter with any additional change in the by-laws be vested with an enlarged committee made up of one representative elected by each district society, and that this committee report at or before the next meeting of the Council.

In continuing the discussion, Dr. Cheever made two suggestions: first, that no office of president-elect be created but that, when referring to the office of vice president, the phrase, "who shall serve as president-elect," be added, and secondly, that certain minor changes in verbiage be made to obviate the necessity for appointing an executive secretary but still permitting such an appointment if it seemed desirable. Dr. Monks stated that he believed the phrase, "the executive secretary need not be a fellow of the Society, should be changed to read, "the executive secretary need not be a physician." Another councilor said that he did not believe the executive committee, proposed in the second part of the report, was truly representative of the Council and that each district society should have a member.

Dr. Butler raised an objection to Dr. Cheever's suggestion of electing the vice president and president-elect in one. He said that the vice president was usually elected because of some outstanding contribution to the Society and that he was not necessarily the one to carry on as president.

Dr. Donald Munro, Suffolk, questioned the advisability of appointing the executive secretary for only one year, since, in his opinion, such an arrangement was distinctly against the probability of obtaining a competent man.

Dr. Norman A. Welch, Norfolk, agreed that the proposed executive committee was not truly representative, and said that he was in favor of Dr. Lionberger's motion, particularly in view of the problem of redistricting.

Another councilor stated that the provision to appoint a fellow to the executive committee for three years raised a complication, since councilors are elected for only one year.

On questioning by the President, Dr. Lionberger repeated his previous statement, namely, that all matters in the report should be considered and reported to the Council by an enlarged committee. After further discussion, Dr. J. H. Blaisdell moved to amend Dr. Lionberger's motion by striking out the words following report of progress

The President then asked the vice-president, Dr. Ober, to take the chair. Dr. Phippen outlined the various advantages to be derived from the proposed offices of president-elect and executive secretary and from an executive committee. He added that redistricting of the Society was a matter that required considered and time-consuming deliberation, whereas the other matters might be advantageously decided at the moment. Dr. Blaisdell agreed with this suggestion and said that that was the reason for his proposed amendment, whereas Dr. Lionberger still maintained that all these matters were inter-related. Dr. Blaisdell's motion of amendment was seconded. At this point the President resumed the chair.

After considerable discussion as to parliamentary procedure, Dr. Blaisdell's motion—to the effect that the report be accepted as one of progress—was put and carried. Dr. Lionberger immediately offered the remainder of his original motion. Dr. George D. Henderson, Hampden, in the absence of a seconding of the previous motion, moved that the creation of the offices of president-elect and executive secretary be considered; this motion was seconded and passed. It was then moved, seconded and voted that the Council approve in principle the election of a president-elect and of an executive secretary.

Dr. Cheever then moved that subsequently elected vice-presidents be designated "president-elect," to succeed at the next following annual meeting. This motion was seconded; it was supported by Drs. Henderson and Edward F. Timmins, Suffolk, and opposed by Drs. Halbert G. Stetson, Franklin, and Peirce H. Leavitt, Plymouth. It was not carried.

Dr. Homans then moved the acceptance of the by-laws relating to the creation of the office of president-elect; the motion was seconded and carried. He then moved that the creation of the office of executive secretary be accepted in principle and that the necessary changes in the by-laws be submitted at the next (special) meeting of the Council. This motion was seconded and carried.

Dr. Charles E. Mongan, Middlesex South, asked for the privilege of moving that an enrollment be taken of the councilors present; he said that this was occasioned by his belief that every councilor should arrange his affairs to be able to stay throughout the meeting. The motion was accepted by the President, seconded and carried. (The Secretary *pro tempore* subsequently distributed papers for enrollment [Appendix No. 16].)

Dr. Tighe called attention to the fact that the matter of the creation of an executive committee was still in the hands of Dr. Homans's committee and that it was the sense of the meeting that each

district society should be represented on such a committee by one member.

Restoration to Fellowship

Ten restorations to fellowship (Appendix No. 17) were authorized by the Council.

New committees to consider restoration for four fellows (Appendix No. 18) were nominated by the President and approved by the Council.

APPOINTMENT OF DELEGATES

The President nominated the following delegates and alternates to the House of Delegates of the American Medical Association:

<i>Delegates</i>	<i>Alternates</i>
John M. Birnie, Hampden	Robert J. Carpenter, Berkshire
Richard H. Miller, Suffolk	Cadis Phipps, Norfolk

It was voted to close the nominations and to declare those nominated as duly elected.

The President then nominated the following fellows as delegates to the annual meetings of the medical societies of the other New England states:

Maine: Edwin D. Reynolds, Essex South, and Stuart N. Gardner, Essex South

New Hampshire: Joseph C. Merriam, Middlesex South, Frank W. Snow, Essex North

Vermont: Ira M. Dixon, Berkshire, and Stanley A. Wilson, Essex South

Rhode Island: Ralph W. French, Bristol South, and Benjamin H. Alton, Worcester

Connecticut: George L. Schadt, Hampden, and George L. Steele, Hampden

The Council confirmed the nominations.

On motion of the President, Dr. Reginald Fitz, Suffolk, was voted delegate to the Annual Congress on Medical Education and Licensure of the American Medical Association, to be held in Chicago on February 17 and 18.

CONFIRMATION OF APPOINTMENTS

The *ad interim* appointment of Dr. John G. Downing, Middlesex South, as councilor was approved.

INCIDENTAL BUSINESS

Dr. DeNormandie read a motion proposed by Dr. Louis E. Phaneuf, Suffolk, namely:

I move that the President appoint a committee of ten doctors to be distributed geographically throughout the State, including at least two pediatricians; said committee to be called a Committee on Maternal

Welfare, with power to deal with all matters pertaining to maternal welfare in the State of Massachusetts

Dr DeNormandie explained that the executive committee of the Section of Obstetrics and Gynecology was a more or less self appointed body, and that the Society should have, as do many of the state medical societies, an officially recognized and appointed committee to act on state and national problems of maternal welfare. The motion was seconded and passed.

Dr Conley, representing Dr Marble, the chairman, moved that the Committee on State and National Legislation be authorized to oppose the three bills presented by the Massachusetts Board of Registration in Medicine. The motion was seconded and passed.

The President then brought up the question of having a new, small sized plate engraved for diplomas of membership, stating that although such a change seemed wise, the officers hesitated to make a change without authority. A motion by Dr Homans to empower the officers of the Society to select a new diploma was seconded and carried.

The Secretary *pro tempore* read a letter from Dr Herbert Margolis, of the Oral Hygiene Council of Massachusetts (Appendix No 19). This was referred to the Committee on Public Health.

Dr Homans remarked that he was a bit uncertain about the duty of the committee appointed to consider changes in the by laws. Dr Tighe placed his former suggestions in the form of a motion that the committee continue and that it explore the possibilities of an executive committee so constituted that each district medical society would be represented. This was seconded and passed.

Dr Daniel J. Ellison, Middlesex North, related experiences with licensed, nonmember, refugee physicians who requested endorsement from the local medical society so that they could obtain hospital privileges. Little or nothing was known about the men, and their requests were denied. The district medical society voted to request the Council to take action on the recommendation that all physicians who are licensed to practice medicine in Massachusetts shall be full citizens of the United States. The motion was seconded and, after considerable discussion, was referred to the committee authorized to investigate the practice of medicine in the Commonwealth.

The meeting adjourned at 3 45 p m

ROBERT N. Nye, *Secretary pro tempore*

APPENDIX NO 1

ATTENDANCE

BARNSTABLE	M W Pearson
M E Champion	G L Steele
W D Kinney	MIDDLESEX EAST
BERKSHIRE	J H Blusdell
I J Boland	Richard Dutton
I S F Dodd	E M Halligan
C F Kernan	J H Kerrigan
G S Reynolds	K L MacLachlan
	R R Stratton
BRISTOL NORTH	MIDDLESEX NORTH
R M Chambers	W M Collins
W H Allen	D J Ellison
F H Dunbar	F L Gage
J L Murphy	A R Gardner
BRISTOL SOUTH	E O Tabor
G W Blood	M A Tighe
J A Fournier	MIDDLESEX SOUTH
E D Gardner	C F Atwood
C C Tripp	E W Barron
P C Truesdale	W B Bartlett
ESSEX NORTH	Harris Bass
R C Norris	E H Bigelow
E S Bagnall	G F H Bowers
R V Baketel	R W Buck
C S Benson	E J Butler
E H Ganley	B F Conley
H R Kurth	P A Consales
P J Look	D F Cummings
G L Richardson	C H Dalton
F W Snow	C L Derrick
T N Stone	J E Dodd
C F Warren	A W Dudley
C A Weiss	H G Giddings
ESSEX SOUTH	H W Godfrey
Loring Grimes	A D Guthrie
H A Boyle	A M Jackson
C L Curtis	F P Lowry
R E Foss	A N Makechnie
P P Johnson	J A McLean
J F Jordan	J C Merriam
B B Mansfield	C E Mongan
A E Parkhurst	E J O'Brien, Jr
W G Phippen	L S Pilcher
E D Reynolds	Max Ritvo
J R Shaughnessy	E S A Robinson
C F Twomey	E F Ryan
FRANKLIN	M J Schlesinger
F J Barnard	W N Secord
A H Ellis	J W Sever
H G Stetson	E F Sewall
HAMPDEN	H P Stevens
F H Allen	H W Thayer
E P Bagg	J H Townsend
W C Barnes	R H Wells
W A R Chapin	Hovhannes Zovickian
A J Douglas	NORFOLK
E C Dubois	F P McCarthy
G D Henderson	J D Adams
	F J Builey
	Carl Bearse

M. I. Berman
William Dameshek
F. P. Denny
G. L. Doherty
D. G. Eldridge
H. M. Emmons
J. C. V. Fisher
Susannah Friedman
Maurice Gerstein
David Glunts
W. A. Griffin
J. B. Hall
I. R. Jankelson
H. L. Johnson
C. J. Kickham
D. L. Lionberger
D. S. Luce
T. F. P. Lyons
Charles Malone
F. J. Moran
M. W. O'Connell
S. A. Robins
S. M. Saltz
D. D. Scannell
Nathan Sidel
J. W. Spellman
J. P. Treanor, Jr.
H. F. R. Watts
N. A. Welch

NORFOLK SOUTH

C. S. Adams
R. L. Cook
H. A. Robinson

PLYMOUTH

A. L. Duncombe
P. H. Leavitt
G. A. Moore
D. W. Pope
F. F. Weiner

SUFFOLK

A. A. Hornor
A. W. Allen
J. W. Bartol
W. B. Breed
W. E. Browne
C. S. Butler
G. C. Caner
E. M. Chapman
David Cheever
M. H. Clifford
Lincoln Davis
R. L. DeNormandie
G. B. Fenwick
Reginald Fitz

Channing Frothingham
John Homans
Rudolph Jacoby
E. P. Joslin
H. A. Kelly
T. H. Lanman
C. C. Lund
H. C. Marble
G. R. Minot
W. J. Mixer
J. P. Monks
Donald Munro
H. L. Musgrave
R. N. Nye
F. R. Ober
J. P. O'Hare
L. E. Parkins
L. E. Phaneuf
Helen S. Pittman
W. H. Robey
G. C. Shattuck
R. M. Smith
M. C. Sosman
Augustus Thorndike, Jr.
E. F. Timmins
S. N. Vose
Shields Warren
Conrad Wesselhoeft

WORCESTER

J. M. Melick
J. C. Austin
Gordon Berry
W. P. Bowers
L. R. Bragg
P. H. Cook
G. A. Dix
E. B. Emerson
G. E. Emery
J. M. Fallon
E. R. Leib
W. F. Lynch
A. W. Marsh
J. C. McCann
J. W. O'Connor
W. C. Seelye
C. A. Sparrow
G. C. Tully
R. J. Ward
F. H. Washburn
S. B. Woodward

WORCESTER NORTH

E. A. Adams
H. C. Arey
C. B. Gay
J. C. Hales

As the Auditing Committee, we have carefully examined the report of these certified public accountants, and approve the figures submitted by them.

EDWIN B. DUNPHY, *Chairman*,
HENRY W. HUDSON, Jr.

* * *

The Auditing Committee:

Dr. Edwin B. Dunphy
Dr. Henry W. Hudson, Jr.

The Massachusetts Medical Society

8 Fenway
Boston, Massachusetts

Gentlemen:

At the request of your treasurer, Dr. Charles S. Butler, we have examined the books and accounts of the Massachusetts Medical Society for the twelve months ended December 31, 1940, and submit herewith:

SCHEDULE A: Statement showing the balance sheet of the Massachusetts Medical Society, December 31, 1940.

SCHEDULE B: Statement showing the revenue and expenses of the Massachusetts Medical Society for the twelve months ended December 31, 1940.

The cash balance at December 31, 1940, was verified by direct correspondence and reconciliation. The cash receipts as recorded have been properly accounted for, and disbursements are supported by vouchers or canceled checks.

The securities and savings bank books in the various funds were examined and found to be as shown in this report.

The accompanying balance sheet and related statement of revenue and expenses fairly present the position of the Massachusetts Medical Society at December 31, 1940, and the results of operations for the year ended on that date.

Respectfully submitted,
HARTSHORN AND WALTER.

50 Congress Street
Boston

* * *

SCHEDULE A

STATEMENT SHOWING THE BALANCE SHEET OF THE MASSACHUSETTS MEDICAL SOCIETY, DECEMBER 31, 1940

ASSETS

Fund Securities and Cash	
Endowment Funds	\$22,166.87
Building Fund	60,069.95
General Fund	122,188.47
Total	\$204,425.29

LIABILITIES (FUND ACCOUNTS)

Fund Accounts	
Endowment Funds	
Shattuck Fund:	
G. C. Shattuck, 1854-1866	\$9,166.87
Phillips Fund:	
Jonathan Phillips, 1860	10,000.00
Cotting Fund:	
B. E. Cotting, 1876-1881-1887	3,000.00
Building Fund	\$22,166.87
General Fund	60,069.95
Total	122,188.47
	\$204,425.29

APPENDIX NO. 2

REPORT OF THE AUDITING COMMITTEE

The report of the examination of the books and accounts of the Massachusetts Medical Society for the twelve months ended December 31, 1940, made by Messrs. Hartshorn and Walter, of Boston, has been submitted to the attention of the Auditing Committee.

ENDOWMENT FUNDS DECEMBER 31 1940

	Securities and Cash	Income
Shattuck Fund		
Annuity policy Massachusetts Hospital Life Insurance Co Certificate No 438	\$9 166 87	\$183 34
Pillips Fund		
\$10 000 Commonwealth of Massachusetts 3 1/2 Jan 1 1944 (reg)	10 000 00	350 00
Coring Fund		
Deposit Institution for Savings in Roxbury Book No 45252	1 000 00	20 00
Deposit Provident Institution for Savings Boston Book No 1878	1 000 00	20 00
Deposit Suffolk Savings Bank Book No 6364	1 000 00	17 50
Totals	\$22 166 87	\$590 84

BUILDING FUND DECEMBER 31 1940

	Securities and Cash	Income	Premium Charge Off
Cash New England Trust Co Boston	\$9 485 30		
Deposit Franklin National Bank Savings Dept Book No 8592	374 91	\$5 53	
Deposit Franklin Savings Bank Book No 1-2518	1 846 93	36 38	
\$1 000 Bethlehem Steel Corp 3 1/2 Cons Mtg Ser 11 Feb 1 1965	1 000 00	12 91	
1 000 Blackstone Valley Gas & Electric Securities C 4s Nov 1 1965	1 025 00	40 00	
1 000 Boston & Albany R R 1st Mtg Series A 4 1/2 Apr 1 1943 (guaranteed)	967 50	45 00	
1 000 Canada Dominion of 3s Nov 15 1968	972 50	30 00	
2 000 Central Ill no 1 Public Service Co 1st Mtg Series A 3 1/2 Dec 1 1968	2 010 00	5 00	
1 000 Central Pacific Ry Co 1st Ref Mtg 4s Aug 1949	717 80	40 00	
— Chesapeake & Ohio R R (Craig Valley Branch) 1st Mtg 5s July 1 1940		50 00	\$12 50
1 000 Chicago Burlington & Quincy R R Co 4s Mar 1 1958	977 78	40 00	
5 000 C/D Chicago R R 1 & Pacific Ry 1st Ref 4s Apr 1 1934 (in default written down)	400 00		
5 000 Conveyancers Title Insurance & Mortgage Co Paris Mtg 4 1/2 Oct 31, 1939 (in default written down)	1 162 09		
1 000 City of Quincy Mass 3 1/2 May 1 1943	1 016 00	35 00	
1 000 Connecticut River Power Co 3 1/2 Series A Feb 15 1961	1 045 00	37 50	
1 000 Elgin Joliet & Eastern Ry Co 1st Mtg 3 1/2 Mar 1 1970 Series A	1 015 00	13 54	
— Joplin Union Depot 1st Mtg 4 1/2 May 1 1940	45 00	39 00	
1 000 Kansas City Mo 4 1/2 Dec 1 1945	1 040 00	42 50	
1 000 Louisville & Nashville R R Co 3 1/2 10 yr Unified extended to Jan 1 1950	1 010 00	3 01*	
1 000 Louisville & Nashville R R Co 4s 20 yr Gold Bond Unified extended to Jan 1 1960	1 005 00	3 44*	
2 000 N Y Central R R S F Sec 3 1/2 Apr 1 1946	1 960 00	75 00	
— N Y Chicago & St Louis R R Notes 6s Oct 1 1941		90 00	
1 200 N Y Chicago & St Louis R R Notes 6s June 1 1950	1 200 00	12 72	
1 000 Quebec Province of 3s July 15 1952	984 14	30 00	
— Shell Union Oil Corp Deb 2 1/2 July 1 1954		106 25	
500 Swampscott Mass Series D 3 1/2 Sept 1 1942	520 00	17 50	
1 000 T & Texas Corp 3s C May 15 1965	1 030 00	10 25	
— Ticonderoga Pulp & Paper Co 1st Ref Mtg 6s Aug 1 1940		60 00	10 00
2 000 Toledo Edison Co 1st Mtg 3 1/2 July 1 1968	2 030 00	70 00	
1 000 U S A Treasury Note Series A 1 1/2 Mar 15 1941	1 000 00	15 00	
200 U S A Treasury Bond 2 1/2 June 15 1954	200 00	1 80	
1 000 U S A Treasury 2 1/2 Sept 15 1950	1 000 00	25 00	
1 000 U S A Treasury Bond 2s Dec 15 1950-48	1 000 00	20 00	
— U S A Treasury Bonds 2s Dec 15 1950-48		9 38	
2 000 Virginia Ry Co 1st & Ref Mtg Series A 3 1/2 Mar 1 1966	2 040 00	55 00	
1 000 Youngstown Sheet & Tube Co (Temperstown) 1st Mtg Series D 3 1/2 Nov 1 1960	1 030 00	36*	

— Boston Medical Library Note 4 1/2 due Apr 1 1941

	19 000 00	807 50	
Totals	\$60 069 95	\$1 966 95	\$61 50
Less bond premiums charge 1 off			61 50
Net income			\$1 905 45
*Interest paid out			
Balance January 1 1940			\$58 099 15
Additions			
Income from securities	\$1 906 95		
Profit on securities sold	65 35		
			2 032 30
Total			\$60 131 45
Deductions			
Bond premiums charged off			61 50
Balance December 31 1940			\$60 069 95

GENERAL FUND DECEMBER 31 1940

	Securities and Cash	Income	Interest Charged Off
Cash Merchants National Bank Boston	\$13 733 60		
Cash New England Trust Co Boston	333 04		
Deposit Franklin Savings Bank Book No 35649	1 074 48	\$21 48	
\$3 000 Appalachian Electric Power Co 4s Feb 1 1963	2 962 50	120 00	
2 000 Atlantic Coast Line R R Co 1st Cons Mtg 4s July 1 1957	1 503 04	80 00	
— Bethlehem Steel Corp S F Series E 3 1/2 Oct 1 1966		40 47	
2 000 Bethlehem Steel Corp 3 1/2 Cons Mtg Series B Feb 1 1965	2 000 00	25 87	
3 000 Blackstone Valley Gas & Electric Co Series D 3 1/2 Dec 1 1968	3 142 50	106 00	
1 000 Blackstone Valley Gas & Electric Co Series C 4s Nov 1 1965	1 025 00	40 00	
2 000 Boston & Albany R R 1st Mtg 4 1/2 Apr 1 1943 (guaranteed)	1 935 00	90 00	
1 000 Canadian Pacific Ry Equip Trust Series C 4 1/2 Dec 1 1943	1 086 25	45 00	
2 000 Carolina Clinchfield & Ohio Ry (Temporery) Series A 4s Sept 1 1965	2 050 00	4 55*	
2 000 Central Illinois Public Service Co 1st Mtg Series A 3 1/2 Dec 1 1968	2 010 00	75 00	
— Central Power & Light Co 1st Mtg 5s Aug 1 1950		20 83	
1 000 Chesapeake & Ohio R R (Warm Springs Valley Branch) Gold 5s Sept 1 1941	1 010 00	50 00	\$25 00
2 000 Chicago Burlington & Quincy R R Co 1st Ref Series A 5s Feb 1 1921	2 155 70	100 00	
2 000 City of Providence R 1 Sewer Loan 4 1/2 Apr 1 1942	2 112 50	39 25	30 00
— Commonwealth of Mass 3 1/2 July 1 1940 (reg)		29 17	20 00
1 000 Commonwealth of Mass 3 1/2 Jan 1 1941 (reg)	1 000 00	35 00	
— Commonwealth of Mass 3 1/2 Jan 1 1941 (reg)		17 50	26 6
1 000 Commonwealth of Mass 3 1/2 Jan 1 1941 (reg)	1 040 00	25 37	11 25
1 000 Connecticut River Power Co 1st 3 1/2 Series A Feb 15 1961	1 045 00	37 50	
2 000 Consolidated Edison Co of N Y Inc 3 1/2 Deb Jan 1 1953	2 035 00	0 00	
2 000 Const meter Power Co 1st Mtg 3 1/2 Nov 1 1969	2 110 00	52 72	
2 000 Conveyancers Title Insurance & Mortgage Co 4 1/2 Dec 1 1937 (in default written down)	400 00		
5 000 Eastern Ry Locomotive & Eng Works 1st Mtg 4s Apr 1 1948 (reg)	5 300 00	26 6*	
3 000 Elgin Joliet & Eastern Ry Co Series A 1st Mtg 3 1/2 Mar 1 1910	3 041 00	40 62	
1 000 Fort Street Union Depot Co 1st Mtg 3 1/2 Dec 1 1915	1 000 00	3 13*	
2 000 Great Northern Ry Co Gen Mtg B 5 1/2 Jan 1 1952	1 932 50	110 09	
1 000 Great Northern Ry Co 1st & Ref 4 1/2 July 1 1961	970 30	47 50	
1 000 Great Northern Ry Co Gen Mtg Gold Series 1 3 1/2 Jan 1 1967	975 00	37 50	
1 000 Jacksonville Terminal Co Series B 6s Ref & Ev Mtg Gold July 1 1967	1 065 00	29 50	
2 000 Jersey Central Power & Light Co 3 1/2 1st Mtg Mar 1 1965	2 050 00	12 74	

1,000 Louisville & Nashville R.R. Co. 3½s Unified Mtg., extended to Jan. 1, 1950	1,010.00	31 99	
1,000 Louisville & Nashville R.R. Co. 4s Unified Gold, extended to Jan. 1, 1960	1,005.00	36.56	
3,000 International Paper Co. Ref. Series A 6s, Mar. 1, 1955	3,076.00	180.00	
1,000 Jones & Laughlin Steel Co. 1st Mtg. Series A 4½s, Mar. 1, 1961	970.00	42.50	
1,000 Koppers Company 1st & Col. Trust Series A 4s, Nov. 1, 1951	1,000.00	40.00	
1,000 Lone Star Gas Corp. 3½s S. F. Deb., Aug. 1, 1953	1,020.00	35.00	
2,000 Metropolitan Ice Co. 1st Mtg. Series A 7s, Jan. 1, 1954	2,100.00	140.00	
660 National Bondholders Corp. Partic. Ctf. (in default)	660.00		
2,000 New Brunswick, Province of, Deb. 3s, July 1, 1944	2,000.00	60.00	
1,000 New Brunswick, Province of, Deb. 3½s, July 1, 1949	1,000.00	35.00	
2,000 New York Connecting R.R. Co. 1st Mtg. Series A, Oct. 1, 1965 (temporary certificate)	2,040.00	5.83*	
4,000 New York, State of, World War Bonus Fund 4½s, Apr. 1, 1941	4,040.00	21.25	58.57
1,000 N. Y. Central R.R. S. F. 3½s, Apr. 1, 1946 (secured)	980.00	37.50	
1,000 N. Y., Chicago & St. Louis R.R. Co. 1st Mtg. 3½s, extended to Oct. 1, 1947	937.50	35.00	
— N. Y., Chicago & St. Louis R. R. 6% Notes, Oct. 1, 1941		45.00	
600 N. Y., Chicago & St. Louis R.R. 6% Notes, June 1, 1950	600.00	6.37	
2,000 Ohio Edison Co. 1st Mtg. 4s, Sept. 1, 1967	2,010.00	80.00	
1,000 Peoples Gas Light & Coke Co. 1st & Ref. Series D 4s, June 1, 1961	975.00	40.00	
— Pittsburgh, Cincinnati, Chicago & St. Louis Ry. Co. Series A 4½s, Oct. 1, 1940		45.00	30.00
1,000 Quebec, Province of, 3s, July 15, 1950	995.37	30.00	
1,000 Revere Copper & Brass Inc. (Temporary) 1st Mtg. 3½s, Nov. 15, 1960	1,025.00	.36*	
2,000 Richmond Terminal Ry. Co. (Temporary) 1st Mtg. 3½s, Sept. 1, 1965	2,100.00	.75*	
2,000 So. Pacific (Ore. Lines) 1st Mtg. Series A 4½s, Mar. 1, 1977	1,605.00	90.00	
— Texas Corp. 3½s Deb., June 15, 1951		23.04	
2,000 Texas Corp. 3s Deb., Apr. 1, 1959	2,070.00	60.00	
2,000 Texas Corp. 3s, May 15, 1965	2,060.00	20.50	
1,000 The Dow Chemical Co. (Temporary) Deb. 2½s, Sept. 1, 1950	1,015.00	.75*	
— Tidewater Assoc. Oil Co. S. F. Deb. 3½s, Jan. 1, 1952		91.39	
1,000 Toledo Edison Co. 1st Mtg. 3½s, July 1, 1968	1,015.00	35.00	
2,000 Troy, N. Y. 4½s (Harbor & Docks), July 1941	2,040.00	10.63*	25.39
3,000 U. S. Cold Storage 1st Mtg. R. E. Gold 6s, Jan. 1, 1945	3,000.00	180.00	
2,200 U. S. A. Treasury 3½s, Oct. 15, 1945-43	2,200.00	71.50	
2,000 U. S. A. Treasury 3½s, Aug. 1, 1941	2,000.00	65.00	
3,000 U. S. A. Treasury 3½s, Oct. 15, 1945-43	3,041.25	97.50	
1,000 U. S. A. Treasury 1½s, Series A Mar. 15, 1941	1,000.00	15.00	
3,000 U. S. A. Treasury 1½s, Series A Mar. 15, 1942	3,003.44	52.50	
500 U. S. Treasury Note ¾s, Dec. 15, 1945	500.00		
2,000 U. S. Steel Corp. ½s, May 1, 1941 ..	2,000.00	5.24	
1,000 The Virginian Ry. Co. 1st Lien & Ref. Mtg. Series A 3½s, Mar. 1, 1966	1,022.50	37.50	
— Western Mass. Cos. 3¼% Coupon Note, due June 15, 1946		27.27	
3,000 Wilson & Co. Inc. Series A 1st Mtg. 4s, July 15, 1955	3,000.00	120.00	
New England Journal of Medicine ..	1.00		
Taunton Note, .13 disc., Nov. 6, 1940		4.69	
Melrose Note, .10 disc., Dec. 19, 1940		4.21	
U. S. Steel Corp. Deb. ¾s, Nov. 1, 1940		2.50	
Totals	\$122,188.47	\$3,283.76	\$226.88
Less bond premiums charged off ..		226.88	
Net income		\$3,056.88	

*Interest paid out.

Balance, January 1, 1940..... \$109,211.62

Additions:

Contributions from Commonwealth of Massachusetts:

Library Extension Service (unexpended balance)	\$1,681.90	
Veneral Disease Control	300.00	
		1,981.90

Unexpended revenue for the twelve months ended December 31, 1940

12,594.95

Total

\$123,768.47

Deduction:

Bond written down per vote of Council: Conveyancers Title Insurance & Mortgage Co.*

1,600.00

Balance, December 31, 1940

\$122,188.47

*Book value of \$2,000.00 written down to \$400.00.

SCHEDULE B

STATEMENT SHOWING THE REVENUE AND EXPENSES OF THE MASSACHUSETTS MEDICAL SOCIETY FOR THE TWELVE MONTHS ENDED DECEMBER 31, 1940

REVENUE

Assessments Received by District Treasurers:

Barnstable	\$500.00
Berkshire	1,270.00
Bristol North	680.00
Bristol South	2,920.00
Essex North	1,873.00
Essex South	2,890.00
Franklin	480.00
Hampden	3,270.00
Hampshire	980.00
Middlesex North	1,240.00
Middlesex South	8,888.54
Middlesex East	1,300.00
Norfolk	8,208.00
Norfolk South	1,340.00
Plymouth	1,405.00
Suffolk	6,725.00
Worcester	4,000.00
Worcester North	930.00
	<u>\$48,699.54</u>

Assessments Received by Treasurer

971.50

Nonresident Assessments

1,569.00

Sale of *Directory*

38.56

Received from Committee of Arrangements

708.79

Income from Funds:

Endowment funds	\$590.84
General Fund	3,056.88
	<u>3,647.72</u>

Profit on Sale of Securities (General Fund)

652.50

Total revenue

\$56,487.61

EXPENSES

Salaries:

Secretary and Secretary <i>pro tem</i>	\$2,750.00
Treasurer	1,000.00
Executive Assistant	2,499.99
Editor Emeritus of <i>Journal</i>	—
	<u>\$6,249.99</u>

Expenses of Officers and Delegates:

President	\$11.81
Secretary	1,370.59
Treasurer	286.60
District treasurers	2,597.84
Censors	759.00
Delegates to American Medical Association	350.28
	<u>5,376.12</u>

General Expenses:

Maintenance of Society headquarters (including clerical and other expenses) ..	\$4,062.41
Shattuck Lecture	200.00
Cotting luncheons	356.00

Standing committees:

State and National Legislation	\$17.49
Public Health	71.30
Medical Education and Diplomas	225.02
Ethics and Discipline	33.66
Public Relations	183.19
	<u>530.66</u>

Publications	
New England Journal of Medicine	\$17,200 00
Directory	1,806 63
	19,006 63
Medical Defense	1,671 45
Medical Preparedness	45 02
Postgraduate Instruction	1,296 53
	32,168 70
Refunds to district societies	5,000 00
Miscellaneous expenses	97 85
Total expenses	43,892 66
Unexpended revenue	\$12,594 95

APPENDIX NO. 3

REPORT OF THE TREASURER

During the year 1940 a number of bonds, owned by the Society and carrying coupons of 4 per cent or more, have been called for early payment. In consequence, the Treasurer has replaced them, in part, by good quality bonds, but with lower interest rates. The result has been to reduce income and also to oblige the Society to maintain an unreasonably large cash balance. As you know, conditions of low-interest returns have existed for several years past, until now, industrial and other prime AA and AAA bonds, even with coupon rates of 2 or 2½ per cent, sell at premiums. The U. S. Treasury is borrowing hundreds of millions of dollars, from time to time, at no cost in interest; in fact, the lenders, in most instances, are paying premiums to the Government to accept their loans. The Treasurer carries in mind, at all times, three impelling considerations: one, the threat of dangerous inflation; secondly, the influence of heavy and heavier federal and state taxation, imposed by present world-wide conditions; and thirdly, the protection of the invested principal of the Society's funds, disregard of, largely, considerations of income.

Revenues, in 1940, from resident dues were \$49,871, showing an increase over 1939. Nonresident dues were \$1569; so that combined annual dues were \$51,440, the largest amount ever received by the Society from this source. Other revenues—from invested funds: \$3647, from sales, \$38; from profits on securities sold, \$652; and from booths at annual meeting \$709—together amount to \$3046. During the year, all interest due (other than on three issues long years in default) and coupons have been promptly paid to the Society. Hence, the total combined revenue in 1940, not including that of the Building Fund, was \$56,487, again the largest amount ever received by the Society.

The Building Fund received income of \$1905 and a small profit from securities sold. Both were added to the Fund, which now amounts to over \$60,000.

Regarding expenses, the Treasurer calls attention to the salary of the editor emeritus of the *Journal*. In previous years he had given generously to the Society. In the past year he would not accept his salary, preferring that the Society should keep it; the Treasurer argued with him, but failed to convince him. Another expense, that of the Committee on State and National Legislation, was \$3200 less in 1940, owing to the fact that the Legislature was not in session.

The Society ends 1940 with total assets of cash and securities of over \$204,000, showing an increase during the year of about \$13,000.

The Treasurer is glad to thank the officers of the Society, the district treasurers, the office staff of the *New England Journal of Medicine* and, in particular, his secretary for their loyalty and help.

The Treasurer invites questions and will be glad to try to answer them.

CHARLES S. BUTLER, Treasurer.

RECAPITULATION OF FINANCES FOR 1940 IN COMPARISON WITH 1939

DISBURSEMENTS		1939	1940
Salaries			
Secretary and Secretary pro tem		\$3 000 00	\$2 750 00
Treasurer		1 000 00	1 000 00
Executive Assistant		2 499 97	2 499 99
Editor emeritus, of <i>Journal</i>		1 200 00	—
Expenses of Officers and Delegates			
President		52 52	11 81
Secretary		1 755 78	1 370 59
Treasurer		291 76	286 60
District treasurers		2 596 77	2 597 84
Censors		885 00	759 00
Delegates to American Medical Association		778 70	350 28
General Expenses			
Maintenance of Society Headquarters		4 120 56	4 062 41
Shattuck Lecturer		200 00	200 00
Cotting luncheons		454 00	356 00
Committee Expenses			
Arrangements (annual meeting)		84 35	—
Publications			
New England Journal of Medicine		20 500 00	17 200 00
Directory		206 47	1 806 63
Ethics and Discipline		238 94	33 66
Medical Education and Diploma		68 47	225 02
State and National Legislation		3 262 50	17 49
Public Health		71 65	71 30
Medical Defense		850 90	1 671 45
Public Relations		488 85	183 19
Postgraduate Medical Instruction		835 84	1 296 53
Medical Preparedness		—	45 02
Physical Therapy		98 50	—
Special Appropriations			
Contribution to Boston Better Business Bureau		50 00	50 00
Surety bond district treasurer (one)		6 25	6 25
Section of Obstetrics and Gynecology		135 41	—
Refund to district societies		4 000 00	5 000 00
Miscellaneous			
		—	41 60
Total expenses		\$49,733 19	\$43,892 66
Unexpended revenue		5,856 90	12,594 95
		\$55,590 09	\$56,487 61
REVENUE			
Assessments			
Paid to district treasurers		\$47,969 11	\$48,899 54
Paid to Treasurer		1 385 00	971 50
Paid to nonresident fellows		1 559 50	1 569 00
Sales <i>Directory</i> and <i>History</i>		16 16	38 56
Income			
Shattuck Fund		206 25	183 34
Philips Fund		350 00	350 00
Cotting Fund		60 00	57 50
General Fund		3 228 40	3 056 88
Other revenue			
Committee of Arrangements		—	708 79
Profit on sales of securities		814 67	652 50
		\$55,590 09	\$56,487 61
FOR COMPARISON			
		1931	1941
Total assets of Society		\$105,195	\$204,000
Building Fund		20 187	60 000
		1940	
Income of Society		40 861	56,487
Expenses of Society		41,695	43,892

APPENDIX NO. 4

REPORT OF THE COMMITTEE ON MEMBERSHIP

The committee recommends:

1. That the following named sixteen fellows be al-

lowed to retire as of December 31, 1940, under the provisions of Chapter I, Section 5, of the by-laws:

Cousens, Nicholas W., Waltham, with remission of dues for 1938, 1939 and 1940
 Dickson, Richard E., Holyoke
 Drummey, Nicholas D., Dorchester
 Gray, Hugh B., Boston
 Hayden, Louis B., Livermore Falls, Maine
 Hurwitz, Abraham J., Boston
 Kazanjian, Hampar P., Los Angeles, California, with remission of dues for 1939 and 1940
 Lally, Francis H., Milford
 Lawler, William P., Lowell
 Lec, Wesley T., Boston
 Mandell, Augustus H., New Bedford
 Noyes, Nathaniel K., Plymouth
 Rice, George B., Boston
 Sawyer, Walter F., Fitchburg, with remission of dues for 1938, 1939 and 1940
 Watts, Henry F. R., Dorchester
 Woods, Charles E., Lunenburg

2. That the following named fellow be recommended for affiliate fellowship in the American Medical Association:

Drummey, Nicholas D., Dorchester

3. That the following named twelve fellows be allowed to resign as of December 31, 1940, under the provisions of Chapter I, Section 7, of the by-laws:

Barrett, Joseph E., Marion, Virginia
 Carbone, Joseph A., Gary, Indiana
 Cohen, Louis H., Norwich, Connecticut, with remission of dues for 1940
 Ehrenclo, Alfred H., New York City
 Hartshorne, Isaac, New York City
 Holt, Charles H., Pawtucket, Rhode Island
 Lewis, Frank E., Nantucket
 Patterson, George W., South Ryegate, Vermont, with remission of dues for 1940
 Price, Noble H., Lamesa, Texas, with remission of dues for 1940
 Reid, William D., Boston
 Reuter, Robert J., Milwaukee, Wisconsin
 Watson, James, Raleigh, North Carolina

4. That the dues of the following named six fellows be remitted under the provisions of Chapter I, Section 6, of the by-laws:

Booth, Ernest L., East Boston, 1941
 Flagg, H. Howard, Charlestown, 1941
 Lawlor, Edward F., Jr., Lawrence, 1938 and 1939
 Moore, Carleton W., Liberia, Africa, 1938 and 1939
 Philbrick, Roscoe H., Coconut Grove, Florida, 1941
 Ruel, Joseph A., Bradford, 1938 and 1939

5. That the following named forty-eight fellows be deprived of the privileges of fellowship under the provisions of Chapter I, Section 8, Clauses *a* and *b* of the by-laws:

Appel, Bernard H., Brighton
 Bailey, Karl R., Jamaica Plain
 Bell, Robert M., St. Louis, Missouri
 Buck, Clifton L., Danvers
 Burnett, Nathan L., Cambridge
 Cabeceiras, Henry J., Belmont
 Canzanelli, Pericles, Watertown

Chayet, Jacob, West Roxbury
 Ciani, A. Walter, Iowa City, Iowa
 Cohen, Harold I., Lynn
 Cregg, Francis A., Methuen
 Cruff, Frederick E., Norwell
 Cummings, Vincent P., North Adams
 Curtin, John F., North Abington
 DeWolfe, Henry M., Braintree
 Dushan, Sidney S., Dorchester
 Ford, Leroy S., Keene, New Hampshire
 Gazzaniga, Dante A., Los Angeles, California
 Gerstein, Maurice, Brookline
 Gilbert, Meyer M., Lynn
 Halbach, Robert M., Jamestown, Rhode Island
 Hannigen, Robert C., Amesbury
 Kudish, Benedict, West Upton
 LaRochelle, Arthur H., Chicopee Falls
 Larsen, Carl J., Orlando, Florida
 Lewis, Robert B., Fort McKinley, Maine
 Liverpool, Coval H., Somerville
 Lynn, Sherwood C., Savannah, Georgia
 McEvoy, George A., Chestnut Hill
 Merrill, Wiggin L., Plymouth
 Mikolaitis, Casimir J., Lawrence
 Milward, Frank W., Cleveland, Ohio
 O'Toole, John L., Haverhill
 Paine, Mortimer H., South Hanson
 Petit, Alphonse H., Ware
 Pulsifer, Nathan, Lowell
 Reese, Lewis L., Waban
 Regan, Timothy F., Lawrence
 Rooney, John F., Worcester
 Rosen, Leonard B., Lynn
 Sannella, Theodore, Revere
 Silver, Maurice J., Dorchester
 Silverman, Nathan, Lawrence
 Stearns, Robert T., Greenbush
 Tynan, James L., East Milton
 Udelson, Barnet A., Roxbury
 Uniac, Thomas V., Lawrence
 Vartanian, Mardiros B., Lawrence

6. That the following named six fellows be allowed to change their membership from one district society to another without change of legal residence, under the provisions of Chapter III, Section 3, of the by-laws:

From Middlesex South to Suffolk
 Colby, Fletcher H., Newton Centre
 From Norfolk to Middlesex South
 Wood, Harold, Jamaica Plain

From Norfolk to Plymouth
 Wheatley, Frank E., Milton

From Norfolk to Suffolk
 Frothingham, Joseph R., Brookline
 Keefer, Chester S., Brookline
 Kunkel, Paul, Brookline

7. That the Council provide for the remission of dues of fellows who are called to full-time service in the United States Army, Navy or Public Health Service, as follows:

Fellows of the Society who are called to full-time service in the United States Army, Navy or Public Health Service during the present emergency and whose livelihood is thereby impaired may, on written application to the Treasurer stating their situation,

have their dues remitted for the year of service. A period of full time service greater than six months shall give the privilege of a year's remission of dues. The *New England Journal of Medicine* will be sent to such members only on payment of an annual fee of four dollars (\$4.00). The president of the Society shall determine the end of the present emergency.

G COLFET CANNON *Chairman*

APPENDIX NO 5

REPORT OF COMMITTEE ON FINANCIAL PLANNING AND BUDGET

The following appropriations are recommended for 1941

Salaries	
Executive Assistant (night June 1)	\$534
Executive Secretary (after June 1)	2100
Secretary	14 0
Until June 1	\$ 50
After June 1	00
Treasurer	9000
Expenses of Officers and Delegates	
President and Vice President	500
Secretary	1500
Treasurer	450
Director treasurers	2 00
Censors	900
Delegates to House of Delegates American Medical Association	800
Maintenance of Society Headquarters	4500
Shack Lecture	200
Cutting Luncheons	450
Standing Committees	
Arrangements	1000
Films and Discipline	150
Financial Planning and Budget	10
Medical Defense	2000
Medical Education and Medical Diplomas	0
Membership	10
Permanent Home	0
Publications	
<i>New England Journal of Medicine</i>	20 500
<i>Directory</i>	500
<i>Public Health</i>	75
State and National Legislation	3000
Special Committees	
Industrial Health	50
Postgraduate Instruction	1000
Public Relations	1000
Section of Obstetrics and Gynecology	150
Returns to District Societies	4000
	\$51 879

APPENDIX NO 6

REPORT OF THE COMMITTEE ON ETHICS AND DISCIPLINE

Since our last report to the Council, the Committee on Ethics and Discipline has held four meetings.

The greatest number of complaints that are received are because of unethical advertising. Fellows against whom such complaints have been made have had letters from the committee asking for an explanation, pointing out the committee's stand and asking them to desist from such methods.

Three complaints have been received because of allegedly exorbitant fees charged by fellows. In one case, after careful investigation, the committee thought the fee reasonable and so wrote the complainant. Our letter straightened out the entire matter, and the complainant has again consulted the fellow for aid in his difficulties.

The other two cases are at present before the courts, and no comment is advisable.

Two fellows have been connected with the procuring of abortions. The resignation of one of these fellows has been accepted by the Council, and the other case is still under consideration by the committee.

There is little or no publicity of the complaints that are brought before us. The committee has many times talked over the advisability of making reports to the Council more specific, even to the extent of mentioning names of those who have proved themselves unworthy of fellowship in the Society.

The committee has attempted by friendly discussion to show fellows who have been called before it wherein the members thought they had erred. Many times these friendly hearings have cleared up difficult situations. Frequently, however, the complaint is serious, the charge definite and the fellow deserves criticism. In such cases we often ask the president of the Society to reprimand the fellow.

The bylaws of the Society give us two other grades of punishment. We can in serious misconduct ask for the fellow's resignation or for a Board of Trial. Fortunately we have not recently considered it necessary to request the latter.

The committee frequently hears that it is not severe enough in dealing with certain cases that so long as there is no publicity no real good comes of its efforts. We cannot agree to this entirely for in some cases we are confident that appearance of fellows before the committee and frank criticism of their action accomplish the purpose. It is only in cases of gross misconduct that the question of greater publicity arises.

The committee welcomes discussion and advice from the Council on this difficult subject.

The committee recommends that the Council favor the change in the bylaws suggested by the Committee on Medical Education and Diplomas.

ROBERT L. DeNORMANDIE *Chairman*

APPENDIX NO 7

REPORT OF THE COMMITTEE ON MEDICAL EDUCATION AND MEDICAL DIPLOMAS

For several years among the applicants for fellowship in the Society the number of graduates of medical institutions not on the list recognized by the Council has been increasing. At the present there are two groups of such graduates. One, and much the larger group, is composed chiefly of graduates of domestic institutions not recognized as medical schools by the American Medical Association. This group also includes a few American born graduates of foreign medical schools who have studied abroad usually because they were not accepted by any recognized domestic medical school. There are a few foreign born foreign educated physicians in this group who migrated to this country, chiefly before 1937. The other group much smaller than the first, is composed almost entirely of foreign born graduates of foreign medical schools who are chiefly German and Jewish but by no means exclusively either. Most of these physicians have migrated recently to this country, primarily to escape political oppression. Almost without exception they have had a good medical education and are of proved ability often being older men of outstanding ability with international reputations.

The members of the Committee on Medical Education and Medical Diplomas are unanimous in believing

that it is in the best interests of the Society to treat these two groups differently. The basis of this difference we believe should be whether or not an applicant has had an adequate medical education and enjoys a good professional reputation. With very few exceptions the members of the first group have had an inadequate education, those of the second an adequate one, and it is usually not difficult to distinguish between them. We believe members of the first group should be admitted to membership only when there is ample positive proof that they can be regarded as truly desirable additions to the Society. At present in the absence of other evidences of undesirability besides an inadequate medical education, they are assumed to be desirable. We cannot agree with this attitude. We believe that the members of the second group should become members of the Society as soon as they have been long enough in this country to have created definite favorable opinion in the minds of colleagues whose judgment would be commonly considered valuable.

The committee has been unable under the present system to evaluate truly the desirability for fellowship of the majority of candidates appearing before it. Repeated attempts to gather information about the prospective candidates from the officers and fellows of the district societies have usually failed. A typical situation is for an applicant who is a graduate of an unrecognized domestic school to appear before the members of the committee; they have never seen him before, but must decide as to his desirability from his appearance, diploma, application blank and a sheaf of letters personally solicited from his medical acquaintances, who invariably say that the applicant "is a capable and conscientious practitioner of medicine" and that his practice is "ethical." Only rarely has the committee received what it regards as a confidential expression of honest intelligent opinion regarding an applicant and his work from colleagues who really know him. Part of the present functioning of the committee as dictated by the by-laws has become farcical in the minds of its members. A major change in this undesirable situation seems impossible under the present by-laws.

The committee therefore recommends that the following changes be made in the by-laws:

The name of the committee be changed to the Committee on Medical Education.

Chapter I, Section 1: In line 5 on page 9, delete the clause, "that their names and addresses . . . prior to their examination by the censors." In line 10 on page 9, omit the words "or college." In line 14 on page 9, after "code of ethics of this Society," insert "that they have made application according to the provisions of chapter V, section 2; that they have paid the examination fee of three dollars."

Chapter I, Section 6: In line 5 on page 10, substitute the word, "December," for "November."

Chapter V, Section 1: Beginning at line 11 from bottom of page 16, delete whole paragraph, "Diploma from medical schools . . . to take an examination."

In line 2 from bottom of page 16 substitute the word, "December," for "November."

At the bottom of page 16 insert the following: "A fee of three dollars shall be paid by an applicant for fellowship to the district secretary for deposit in the funds of the general Society before each examination or re-examination by the censors. An applicant shall not be considered as possessing the requisite qualifications for fellowship unless approved by at least three censors. An applicant failing two examinations

shall be disqualified from again applying for fellowship until three years have elapsed from the date of the last application."

Chapter V, Section 2: Change to read as follows: "An applicant for fellowship who is a graduate of a medical school recognized by the Council shall apply on a form furnished for the purpose to the secretary of the district in which he has legal residence, not later than March 1 for the May censors' examination or October 1 for the December censors' examination. At this time the district secretary shall verify the applicant's diploma and shall deliver the application form to the secretary of the Society not later than March 10 or October 10 respectively. An applicant nonresident in Massachusetts shall apply to the secretary of the Suffolk District Medical Society and shall be examined by the censors thereof. Consideration of a late application shall be postponed until before the next succeeding examination. The names of all such applicants, their addresses, medical schools and dates of graduation, and the names and addresses of the various district secretaries shall be published in a list in the first number of the *New England Journal of Medicine* on or after April 1 or November 1. Confidential communications regarding the qualifications of applicants for fellowship shall be requested of the fellows of the Society to be sent to the appropriate district secretary not later than April 15 or November 15.

"An applicant for fellowship who is a graduate of a foreign medical school or a domestic medical school not on the list recognized by the Council or of a medical school no longer in existence, and who has practiced for a minimum of five years, shall apply for fellowship in like manner with the following exceptions and additions:

"The application form must be submitted to the district secretary not later than February 15 or September 15. At this time also the applicant must submit the name and address of a fellow of the Society who has agreed to act as his sponsor. The sponsor's duty is to obtain from fellows of the Society, who are acquainted with the applicant and his work, confidential written opinions regarding his qualifications for fellowship to be mailed directly to the district secretary not later than March 15 or October 15. The application form of such an applicant shall be delivered by the district secretary to the secretary of the Society not later than February 20 or September 20. A list, similar to that of applicants who are graduates of recognized schools, but with the addition of names and addresses of sponsors, shall be published in the first number of the *New England Journal of Medicine* on or after March 5 or October 5.

"The president, secretary and supervising censor of the district society, sitting as a local board of membership, shall then gather such further information as is deemed necessary to determine whether an applicant is a capable and conscientious practitioner of medicine and possesses a good professional reputation among his colleagues. Every candidate must be personally interviewed by this board.

"The district secretary shall deliver to the chairman of the Committee on Medical Education a complete confidential file of all applications, including correspondence and written recommendations of the local board with supporting reasons for advocating the acceptance or refusal of each applicant not later than

April 1 or November 1. The committee shall then determine whether or not each candidate shall be approved for examination by the censors and shall notify the district secretary and each applicant of their decision not later than April 20 or November 20.

Chapter V, Section 3 In line 4 on page 17 after the words "applicants for fellowship insert clause they shall see that each applicant pays the examination fee."

Chapter VII, Section 5 Change the first two paragraphs to read as follows

The Committee on Medical Education shall consist of five fellows. It shall consider all matters relating to medical education which may be referred to it by the Council. It shall review the case of every applicant for fellowship who presents according to the provisions of chapter V, section 2, a diploma from a medical school not on the list recognized by the Council. It shall have the power to approve for examination by the censors such an applicant, and all decisions of the committee thereon shall be final. It shall revise the list of medical schools and colleges recognized by the Council whenever it appears necessary.

A recent ruling by the President reversed the previous interpretation of the provisions of the bylaws regarding the application for readmission to the Society of a former fellow whose resignation had been requested by the Committee on Ethics and Discipline. Inasmuch as the person in question was a graduate of an unrecognized school, it was ruled that he had to appear before the Committee on Medical Education and Medical Diplomas for approval, before being allowed to appear before the censors. Owing to information requested from the chairman of the Committee on Ethics and Discipline, the Committee on Medical Education and Medical Diplomas disapproved the application. The latter committee, as a result of this case, felt that it should have no jurisdiction in such cases of readmission to the Society, and as a result studied the provisions of the bylaws regarding readmission. With the approval of the Committee on Ethics and Discipline and the Committee on Membership it recommends that the following changes be made in the bylaws:

Chapter I, Section 7 Change to read as follows

The resignation of fellows whose assessments have been paid in full or remitted, may, on recommendation of the Committee on Membership, be accepted by the Council. Petitions to be allowed to resign should be addressed to the Council and sent to the treasurer of the Society.

Chapter I, Section 8 Omit last paragraph, "Fellows who have been deprived Secretary of the general Society."

To Chapter I add Section 10, to read as follows

"Former fellows who desire to be readmitted to the Society shall make application in writing addressed to the Council and sent to the secretary of the Society. Such applications shall be referred for investigation and personal interview to the local boards of membership, which shall report their recommendations to the Committee on Membership. The Committee on Membership shall render the final decision as to whether to recommend to the Council the readmission of former fellows. The Council shall have power to readmit former fellows so recommended. Boards having under consideration the applications of fellows whose resignations have been requested by the Committee on Ethics and Discipline or who have

been deprived of fellowship under the terms of Section 8, clause (c), shall consult with the Committee on Ethics and Discipline before reporting their recommendations.

JOHN P. MONKS, *Chairman*

APPENDIX NO 8

REPORT OF THE COMMITTEE ON STATE AND NATIONAL LEGISLATION

The Committee on State and National Legislation will report its activities chronologically beginning early in the fall of 1940.

After organization, we met with the State Board of Registration in Medicine, at their request, to discuss the proposed legislation. It was then that the committee was told that, in the past, the Massachusetts Medical Society had not been co-operative. Your committee, however, expressed a willingness and anxiety to co-operate and work together.

The legislation proposed by the Board was as follows: A bill for the annual registration of physicians, a bill requiring town clerks to report the registration of physicians and impose a penalty on physicians for failure to register with the town clerk, and a bill calling for a special commission to investigate the advisability of requiring special qualifications for physicians engaged in the practice of surgery.

In the discussion of the bill for annual registration, the difficulties under which the Board is working were taken up, and the inadequacy of the examination that is given to prospective candidates was illustrated. The large number of candidates and the lack of time make it possible to give a very limited written examination. The following is quoted from the report of Dr. Knowlton reprinted from the *Proceedings of the Annual Congress on Medical Education and Licensure* (Chicago, February 15 and 16, 1937):

The result is that the examinations are hodgepodge and a smattering of this and that subject with equal evaluation of each. In an examination given last fall, there were 220 applicants, about 90 came from approved schools and the remainder from nonapproved institutions. One examiner passed 156 of these applicants, with many high marks, another passed only 38, with just 6 or 8 ranging higher than 80 per cent. The general average passed by the other board members was 83 of the 220 applicants. Our problems in medical licensure in Massachusetts, therefore, are due almost solely to an out-of-date and clumsy medical practice act. It could be probably entirely rewritten if the state medical society would show real interest in changing it. There seems, however, no such interest. Instead, there seems to be an apathy bordering on an aversion of the society to do anything that will raise or improve the standard of practice in Massachusetts by changing the medical practice act. The backing of the society is absolutely essential before any real good can be accomplished.

It further appeared that on the day of our conference the Board had examined 100 alien physicians and had given each a personal interview. All the rest of the candidates had had only a written test. There was no oral or practical examination.

Upon further discussion of the matter of annual regis-

tration, we made it clear that based on the Dutton report (*New England Journal of Medicine* 222:393-396, 1940), we did not believe that it was advisable to push annual registration at this time, and we did not believe it would serve any useful purpose. The Board, however, reiterated to us the necessity for a larger budget, and we offered to them the proposal that if this legislation was not pressed we, as a committee, would go before the Budget Commissioner and ask for an adequate budget for the Board with which to carry out its work.

In regard to the second proposal, a bill requiring town clerks to report the registration of physicians and impose a penalty on physicians for failure to register with the town clerks, your committee agreed to approve this bill and promised to support it.

Relative to the third proposal, calling for a special commission to investigate the advisability of requiring special qualifications for physicians engaged in the practice of surgery, your committee took the stand that this should be an educational matter and strongly urged that it be referred to the Massachusetts Medical Society for thorough study, including the whole problem of restrictive licensure. We, therefore, promised that a resolve would be presented to the Council.

In spite of this agreement, all these bills were introduced. The Board reported that there had been a misunderstanding. Nevertheless, your committee feels bound to carry out its part of the bargain. We continued our request for an opportunity to go before the Budget Commissioner, and it was not until January 23, 1941, that we received a letter stating:

At the meeting of the Board of Registration in Medicine held January 9, 1941, your letter of January 8, 1941, was presented and the matter of the amount requested in the budget was considered. It was the sense of the Board that while a greater increase in the budget might be required later this year, the request for \$4097.50 for general expense is reasonable compared with actual expenditures.

In other words, despite repeated statements that the Board has not enough money to investigate and prosecute, they do not now require further funds. So far as we have been able to ascertain, the Board of Registration in Medicine has been given by the Budget Commissioner the amounts requested annually.

It is the considered opinion of this committee that the Board of Registration in Medicine is not giving adequate examinations (see Dr. Knowlton's report); that annual registration is unnecessary (see Dr. Dutton's report); that the practice of surgery in the Commonwealth would be best studied by a committee or commission of the Massachusetts Medical Society; and that the Board of Registration in Medicine does not now require more funds with which to carry on its work.

Following this, various legislative bills were studied, and we have attempted to keep up to date as they have been introduced. In general, these cover the bills introduced by the State Department of Public Health, bills requiring certain premarital examinations, a bill requiring an all-nurse board of registration, the osteopathic bill and the chiropractor bill. However, all these bills have been late in printing and at the present date, many of them are not in our hands. As soon as we can obtain these bills, a legislative bulletin will be made up and transmitted to the various members of the Society.

In each district a legislative committee has been appointed. They can be of tremendous value to us, and it is to them that we shall furnish the material relative

to legislative matters. We shall be appreciative of their support, and suggestions and recommendations are requested.

We present the following recommendations:

That a committee be appointed by the President to investigate the whole matter of admission to practice medicine in the Commonwealth.

That a second committee be appointed by the President to consider the matter of the practice of surgery, and also the matter of restrictive licensure.

HENRY C. MARBLE, *Chairman*.

APPENDIX NO. 9

REPORT OF THE COMMITTEE ON CANCER

The chief work of the Committee on Cancer during the past year has been aiding in the preparation and distribution of the book, *Cancer: A manual for practitioners*, a copy of which was sent to the address of every physician licensed to practice in the State. This book has been planned to aid the physician by giving him generally accepted facts about different phases of neoplastic disease, by giving him a clear picture of what is done by the State and by the national government in the field of cancer control and cancer research, and by giving him as well a source of material from which he may draw when called upon to address lay organizations on the subject of cancer. The committee realizes that in work of this type imperfections are inherent. Nonetheless, it believes that through the whole-hearted co-operation of a large group of men a succinct body of knowledge has been made available.

The various aspects of the cancer-control program of the State are continuing along the lines outlined by agreement with this committee. The committee believes that much of the success of this program, widely recognized as outstanding, has been due to the vision of the Department of Public Health and to the guidance of Dr. Herbert L. Lombard, the director of the Division of Adult Hygiene.

SHIELDS WARREN, *Chairman*.

APPENDIX NO. 10

REPORT OF THE COMMITTEE ON PUBLIC RELATIONS

The committee presents the following report for your information and endorsement:

1. Dr. N. W. Faxon, representing the Blue Cross, invited our consideration of a project for the inclusion of individual subscribers—at slightly higher rates and after physical examination—in the plan for prepaid hospital care. The plan was approved in principle, and the committee after discussing several alternatives recommended that the Blue Cross select the panel of examining physicians. Other conditions of participation by physicians will be decided after further conference. The plan will not be initiated for several months.

2. A subcommittee of the Committee on Public Relations conferred with Drs. Huber and T. Duckett Jones, representing the Department of Public Health on January 15, 1941, in relation to the program for rheumatic heart disease. It was agreed that the plan should be operated at its inception in Boston, Worcester and Spring-

field and that only patients residing in the immediate vicinity of these centers should be admitted to its care. It was further agreed that the project would be extended only after conference and agreement between the Department of Public Health and the district medical societies.

Dr Huber favors a plan to have the family physician compensated for the first diagnostic visit and for follow-up visits after the patient is discharged from the hospital. He also recommends that the district society have a standing committee appointed to represent the interests of the physician in the selection of patients and so forth. As an indication of the prevalence of this condition it was found in a Connecticut survey that about 5 per cent of the school children were afflicted and 50 per cent of these were unrecognized.

The Department of Public Welfare at the State House has since the last Council meeting appointed as its medical adviser, under special statute—Dr B W Mandelstam. Dr Mandelstam has energetically proceeded toward an understanding of the problems involved in the administration of medical care to welfare and old age recipients.

Dr Mandelstam is making a survey of the three hundred and fifty-one communities in the Commonwealth. Approximately 38 per cent have furnished medical care on a contract basis and the other 62 per cent are allowed free choice of physicians under one plan or another. The free choice is usually allowed in the smaller communities. Several plans now in operation supply adequate medical care to the indigent and at the same time allow reasonable remuneration to the physician. Such plans have been more successful when the local medical group assumes intelligent initiative in the solution of these problems. It is obvious that no single plan would be feasible on a state-wide basis. The committee will stimulate the district committees on public relations to take the initiative in each of their several localities, consulting with the local welfare administrators with the view to improvement of existing conditions.

The Department of Public Welfare has selected a representative advisory committee of physicians to assist in the formulation of policies which will meet for the first time this evening. Our committee anticipates that this advisory committee may well carry on the work which inspired the appointment of this special committee by the Council.

The committee carefully considered with the Lanman committee and its legal advisers the enabling legislation for medical costs insurance.

We agreed upon and endorsed a bill for introduction into the Legislature. This bill has been filed at the State House and published in the *New England Journal of Medicine* and a copy has been mailed to each councilor. The officers of the committee met jointly with the Lanman committee and the Committee on State and National Legislation and agreed on the several responsibilities for advancing this bill toward enactment.

Because it has been reported that the White Cross representatives were creating the impression that they had tried unsuccessfully to meet our representatives for discussion of enabling legislation looking toward agreement and because editorials appeared in the daily papers indicating that the public interest would be served by agreement, the President after joint conference with the Lanman committee, the Committee on State and National Legislation and the Committee on Public Relations was authorized to arrange a conference if it was desired by the White Cross. The President thereupon arranged a

meeting for January 31, at the Tavern Club, to see if there could be agreement on a joint bill which might be substituted for the two bills on file. At this conference it was suggested that a compromise bill might be drawn up, and two representatives from each group were chosen—Drs Lanman and Tighe for the Massachusetts Medical Society and Mr Russell and Dr Frothingham for the White Cross. Thereupon Mr Twomey, our legal counsel, burned the midnight oil and prepared a joint bill for discussion by these conferees on February 2. At this meeting no agreement was reached but our conferees called a meeting of the Committee on Public Relations on the following day.

On February 3 a combined meeting of the Lanman committee, the Committee on State and National Legislation and the Committee on Public Relations was held at which the joint bill drawn up by Mr Twomey for the conferees was presented without recommendation or prejudice by Dr Tighe, vice-chairman of the Committee on Public Relations. Several hours were consumed in discussion, and it was eventually unanimously voted that support of the bill of the Society be reaffirmed with the following changes in the reading:

Section 3 be amended to read and not less than one third of the directors shall be persons who are or who agree to become subscribers to the Massachusetts Medical Society plan. (This is to be added at the end of the first sentence. The amendment was added because the bill does not specifically provide subscriber representation on the Board of Directors.)

Sections 1 and 7 to be amended to read: "medical service instead of general or special medical care." (This change was made in order that groups such as osteopaths or physicians not members of the Massachusetts Medical Society might not be disturbed by the original terminology, which could be interpreted as discriminating against them.)

These amendments are to be introduced with the Committee on Insurance whenever our responsible representatives consider it prudent.

The committee believes that this legislation is in the public interest. It was drawn up by the Lanman committee and its legal counsel after careful study of all the plans now operating in the United States under medical society sponsorship.

ELMER S. BARNALL, Secretary

APPENDIX NO 11

REPORT OF THE COMMITTEE ON POSTGRADUATE INSTRUCTION

This is the fourth year that the Society has given postgraduate extension courses, in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, to all the physicians in the Commonwealth. The courses were started on October 22, 1940 and have been given in the following places:

DISTRICT	PLACE
Barnstable	Hyannis
Bristol North	Taunton
Bristol South	New Bedford
Essex North	Lawrence
Essex South	Salem
Middlesex East	Melrose

Middlesex North	Lowell
Middlesex South	Cambridge
Norfolk	Norwood
Norfolk South	Quincy
Plymouth	Brockton
Suffolk	Boston

The rest of the State will have similar courses this spring. A final report on the extension courses will be made at the annual meeting.

As reported at the October meeting, the committee has been instrumental in inaugurating a postgraduate extension library service, which has just begun to operate. This is a new service which the committee hopes will be useful to physicians, particularly to those who do not have nearby library facilities. Reference books and periodicals at present are related to the current postgraduate extension courses. Eventually this list may cover all major fields of medicine. All reference material will be delivered free to physicians who apply. State and federal agencies are aiding in financing this project, and the Boston Medical Library has charge of all details of organization. A final report will be made at the annual meeting. The committee is indebted to Dr. Paul J. Jakmauh, commissioner of public health, and to the United States Public Health Service for their interest and aid in helping to provide funds to finance this project.

Again this year the Society has organized clinical teaching in the diagnosis and treatment of gonorrhea and syphilis at the Boston Dispensary and the Out Patient Department of the Massachusetts General Hospital. These clinics are free and open to all legally registered physicians in Massachusetts. A final report on this phase of postgraduate instruction will be made at the annual meeting.

The third New England Postgraduate Assembly was held November 13 and 14, 1940. This was a co-operative program sponsored by the state medical societies of Maine, New Hampshire, Vermont, Massachusetts and Rhode Island. The program was excellent, and we herewith express the thanks of the societies to the following guest speakers who made the program a success:

Dr. Fred L. Adair, Chicago
 Dr. Henry W. Cave, New York City
 Dr. Russell L. Haden, Cleveland
 Dr. Sumner L. Koch, Chicago
 Dr. Robert F. Loeb, New York City
 Dr. Harrison S. Martland, Newark
 Dr. T. Grier Miller, Philadelphia
 Dr. Oliver S. Ormsby, Chicago
 Dr. P. S. Pelouze, Philadelphia
 Dr. Tracy J. Putnam, New York City
 Dr. Ralph M. Waters, Madison

The attendance at the assembly was 580 as follows:

Massachusetts	442
Maine	38
New Hampshire	34
Rhode Island	30
Vermont	27
New York	3
Connecticut	2
Montana	1
Ohio	1
Tennessee	1
Washington	1
Total	580

The attendance for the first year was 925, and for the second year, 776. The weather was doubly inclement this past year, since there was a severe rainstorm on both days. The committee believes that there should be more publicity and has appointed a committee for this purpose. On account of the lower attendance there was a deficit of \$682.18. It is expected that advance enrollment will ensure no deficit; also it has been voted to hold the assembly about mid-October, at which time better weather is anticipated.

The committee is very glad to report that the Connecticut State Medical Society, at a meeting of the House of Delegates on December 12, 1940, voted to be a co-sponsor of the next assembly. With the six New England state medical societies backing the assembly, we believe that it will be a success.

The committee recommends the following:

1. That the postgraduate extension courses, teaching clinics and postgraduate extension library be continued, as now organized, and such further co-operation with state and federal agencies be authorized as may be of educational value to the medical profession.
2. That the Society participate with the other New England state medical societies in presenting the New England Postgraduate Assembly next fall.

FRANK R. OBER, *Chairman*,
 LEROY E. PARKINS, *Secretary*.

APPENDIX NO. 12

REPORT OF THE COMMITTEE ON INDUSTRIAL HEALTH

Meetings of the Committee have been held monthly except during the three summer months. At the December meeting a member of the Council on Industrial Health of the American Medical Association was present and discussed future plans.

The committee has made a number of reports, which have been published in the *New England Journal of Medicine*, outlining the activities of the committee and presenting matters of interest to members practicing industrial medicine or considering such practice. It has reported some interesting cases of industrial origin or having an industrial interest. It has also published questions and answers to problems having to do with industrial practice.

Progress in terms of the actual results in the field is slow, but by frequent meetings and by outside contacts the committee hopes to provide an increasingly valuable service to the members of the Society.

W. IRVING CLARK, *Chairman*.

APPENDIX NO. 13

REPORT OF THE COMMITTEE ON THE ARMY MEDICAL LIBRARY AND MUSEUM

This committee has not been active in the last year except through correspondence with the senators and representatives from Massachusetts and with Colonel Harold W. Jones, librarian of the Army Medical Library.

A communication from Colonel Jones dated December 12, 1940, is as follows:

As you undoubtedly know, an appropriation of \$130,000 was made at the last session of Congress for the plans of the library and the museum. The Secretary of War has just approved the recommendation of General Magee for the appointment of an architectural firm to prepare the plans. This firm is one of the outstanding ones in the country, and there can be no doubt whatever that a building entirely in keeping with our high aims will be the eventual result. Within a few weeks I feel sure that the work of planning will be under way. The Surgeon General has indicated that preliminary plans and drawings only will be completed at this time, leaving the working drawings until a site has been definitely selected. It will probably be but a matter of a few months until it can be determined just what site will be selected, and it remains only for an appropriation to be made because there are a number of locations which would be entirely acceptable.

As you and your committee know from the investigations which you have already made, the time element is a most important one. Five years ago the library was reported to be in a serious condition so far as room for new accessions and new activities go. In those five years, through very careful planning and the utilization of every possible place including corners and corridors, and through the removal of about fifty tons of duplicate material to storage elsewhere, the librarian was able to make room for about 45,000 additional books. This space has been nearly filled now, and within one year serious embarrassment in the way of housing new accessions will be present. Within two years it is a practical certainty that a portion of the collection will have to be housed elsewhere. If action can be taken now and the new building can be started in 1941, I believe this embarrassment can be minimized, because within two years there would certainly be space in the new building, even if it were not entirely completed, to store some of our material. However, if we are to face a delay of three or four years, and the matter is postponed in the future as it has been in the past, we are indeed in a bad way. I do not suppose that I could emphasize the whole situation any better, and I feel that you will understand the anxiety that General Magee and I have over any possibility of further delay.

In view of Colonel Jones's report a second series of letters has been written to the senators and representatives from Massachusetts.

HENRY R. VILTS, MD, *Chairman*

APPENDIX NO 14

REPORT OF THE COMMITTEE TO EQUALIZE DISTRIBUTION AMONG PHYSICIANS OF MEDICAL SERVICE TO WPA EMPLOYEES

This committee has had one meeting, which was held in the WPA office in Boston on November 20, 1940. As a result of this meeting a letter was sent to each district secretary giving the names of our committee and its purpose and asking each of them to forward to us any complaints which they had or might receive from their members in regard to the distribution of medical service to WPA employees and also to inform each secretary that

any suggestions to assist this equalization would be welcomed.

Each month one of the members of our committee visits the WPA office in Boston and checks the records of payments to doctors for this service. At this time, Mr. Burns, of the WPA office, has ready for discussion or adjustment any abuses that have come to his attention.

At the end of each six months, Mr. Burns is to have a listing of all physicians doing this work according to communities and the amount of money received. This will enable us to take definite action toward equalizing the work, by dropping off from the list of available physicians the names at the top until other physicians have caught up with them as regards the amount of money collected. Mr. Burns and the committee are in agreement on the principle of genuine free choice of physicians by the injured workman.

This program sometimes meets with determined opposition. For example, one physician who had for months received far more than his share of WPA patients, and had then been cut off, appealed to his congressman for help. Many other forms of pressure are being applied to get or keep this type of practice.

This committee has no motion or recommendation to submit to the Council at this time.

GUY L. RICHARDSON, *Chairman*

APPENDIX NO 15

REPORT OF THE COMMITTEE TO CONSIDER NEW OFFICERS AND BY LAWS

Following the Council meeting of October 2, 1940, a committee was appointed by the president of the Massachusetts Medical Society to study the desirability of establishing the offices of president-elect and full time or executive secretary and to suggest the necessary changes in the by laws required to create these positions. The committee believes that these two new positions are desirable and has consequently formulated the changes in the by laws necessary for the creation of these offices.

In respect to the second part of its duties, that is, to study the propriety of altering the constitution and by laws in such a way that they would conform to those of other state medical societies, the committee reports that any attempt in the nature of redistricting involves too great a change in policy for a committee of this sort, which is probably not sufficiently representative, to act upon.

The committee has seen no need of altering the nomenclature of the governing body, the Council, or its method of election. It does recommend the creation of an Executive Committee of the Council—a smaller body, selected in such a way as fairly to represent, geographically and numerically, the fellows of the Massachusetts Medical Society.

There is also submitted a table to explain the units represented by the elected members of the Executive Committee. (The ease of geographic division is apparent if one refers to the map of the district societies in the *Directory*.)

The changes in the by laws necessitated by the creation of the offices of president-elect and executive secretary and the creation of an Executive Committee of the Council follow.

JOHN HOMANS, *Chairman*

CHAPTER III
DISTRICT SOCIETIES

Section 5. (Additional.)

The councilors of each district society shall meet as soon as possible after the annual meeting of the district society in 1941 and elect two or more of their number to serve as candidates for the Executive Committee of the Council in accordance with chapter IV, section 10; and thereafter in a similar manner they shall choose new candidates from time to time.

Section 7. (Additional.)

The secretary of each district society as soon as possible after the annual meeting of the district society in 1941 shall call together its councilors for the purpose of selecting the candidates for the Executive Committee of the Council and shall send the names of those chosen to the Secretary of the general Society. He shall see that new candidates are chosen in a similar manner to fill vacancies as they occur, in accordance with chapter IV, section 10.

CHAPTER IV
THE COUNCIL

Section 1. The Council shall consist of councilors chosen by the district societies, and the President, ex-presidents, President-Elect, Vice-President, vice-presidents *ex officio*, Secretary and Treasurer of the general Society, secretaries of the district societies, and the chairman of each standing committee.

Section 3. The Council at its annual meeting, on nomination by the Nominating Committee and/or from the floor, shall elect by ballot officers of the Society as follows: President-Elect, who shall serve as President-Elect until the annual meeting of the Society next ensuing after his election and shall become President on his installation in the course of that meeting, serving thereafter as President until the next following annual meeting and the installation of his successor; a Vice-President, Secretary and Treasurer, all of whom shall assume the duties of office at the close of the annual meeting of the Society and shall hold office until their successors have been duly elected; except only that at the annual meeting of the Society in 1941 there shall be nominated and elected a President to serve for that year. Councilors only shall be eligible to the offices above named. Upon nomination by the Nominating Committee, it shall elect by ballot a fellow to deliver an oration at the annual meeting of the Society the following year.

Upon nomination by the Nominating Committee, it shall elect by ballot members of the Executive Committee representing, respectively, the various units of district societies in accordance with section 10 of this chapter.

Section 10. The Executive Committee shall consist of the President, President-Elect, Vice-President, Treasurer and Secretary *ex officio*, the chairmen of the following standing committees, namely, Ethics and Discipline, Financial Planning and Budget, Membership, Publications and State and National Legislation, and those members elected by the Council.

The elected members, all of whom shall be councilors, shall be chosen, respectively, from geographical units of the Society so arranged that each member of the Executive Committee shall represent at least five hundred fellows of the Society as of January 1, 1941; except that if the number of fellows in any unit shall thereafter fall below five hundred, that unit shall still be entitled to its member, unless the Council orders otherwise.

These members shall be nominated and elected in the following manner:

(a) The councilors of each district society shall meet as soon as possible after its annual meeting in 1941 and in a similar manner at stated intervals thereafter, as specified below, to choose two of their number for presentation to the Nominating Committee; except that the councilors of any district society which alone represents one unit shall choose four nominees, and except that the councilors of any district society having more than five hundred fellows shall choose two additional nominees for each additional five hundred fellows or major fraction thereof.

(b) From the list of nominees representing each unit, the Nominating Committee shall choose, for election at the next annual meeting of the Council, at least twice the number of names eligible for election from that unit.

(c) From the list of councilors offered by the Nominating Committee, the Council at its annual meeting shall

Basis for Election of Members of Executive Committee of the Council.

UNITS	COMPONENT DISTRICT SOCIETIES	No. OF FELLOWS*	No. NOMINATED BY COUNCILORS OF EACH DISTRICT SOCIETY	No. PRESENTED BY NOMINATING COMMITTEE TO COUNCIL FOR ELECTION	No. ELECTED BY COUNCIL
Western	Franklin	52	2	2 or more	1
	Berkshire	136	2		
	Hampden	343	2		
	Hampshire	73	2		
		604			
Worcester	Worcester	436	2	2 or more	1
	Worcester North	109	2		
		545			
Middlesex	Middlesex North	144	2	4 or more	2
	Middlesex South	1043	4		
	Middlesex East	137	2		
		1324			
Essex	Essex North	224	2	2 or more	1
	Essex South	325	2		
		549			
Suffolk	Suffolk	714	4	2 or more	1
Norfolk	Norfolk	888	4	4 or more	2
	Norfolk South	156	2		
		1044			
Cape	Plymouth	163	2	2 or more	1
	Bristol North	73	2		
	Bristol South	213	2		
	Barnstable	52	2		
		501			

*Based on figures of December 26, 1940.

elect by ballot, to represent each unit of district societies, one or more members to serve on the Executive Committee, according to the following plan, which may be altered by the Council at its annual meeting from time to time:

From Berkshire, Franklin, Hampden and Hampshire, designated as the Western Unit, one member.

From Worcester and Worcester North, designated as the Worcester Unit, one member.

From Middlesex North, Middlesex South and Middlesex East, designated as the Middlesex Unit, two members.

From Essex North and Essex South, designated as the Essex Unit, one member

From Suffolk, designated as the Suffolk Unit, one member

From Norfolk and Norfolk South, designated as the Norfolk Unit, two members

From Plymouth, Bristol North, Bristol South and Barnstable, designated as the Cape Unit, one member

(d) The members of the Executive Committee shall serve for three years and shall not be eligible for re election before the expiration of three years following the conclusion of their terms of office, except that in 1941 three members shall be selected by lot to serve one year, three members shall be selected by lot to serve two years and three members shall be selected by lot to serve three years. Thereafter three members shall be elected every year to succeed in office those whose terms are about to expire and shall be nominated by the councilors of the various district societies concerned, as already described in subsections a, b and c of this section, unless the Council otherwise directs.

The Executive Committee shall meet at the call of the President at least once in each interval between Council meetings and may meet oftener at the pleasure of the President. It shall assist the President in preparing for the consideration of the Council matters calling for action by the Council at its next meeting. It shall authorize action when circumstances require it, subject to the approval of the Council. It shall perform such other duties as the Council may require.

The consent of the Executive Committee shall be required to confirm the appointment, upon nomination by the President, of the Executive Secretary of the Society.

Upon request, members of the Executive Committee shall be paid the amount of their traveling expenses from the funds of the Society.

CHAPTER V

CENSORS AND SUPERVISORS

Section 1 The supervisors, representing the censors of the several district societies, shall constitute a board, which shall meet annually on the day appointed for the annual meeting of the Council. The board shall elect a chairman, who shall have power to call special meetings. Five supervisors shall constitute a quorum. The secretary or executive secretary of the general Society shall act as secretary of the board. He shall keep a permanent record of the proceedings of the board, and shall provide, at the expense of the Society, papers and forms necessary for conducting examinations of applicants for fellowship. The board at its annual meeting shall adopt a uniform plan for the examination of applicants. The supervisors shall be paid the amount of their traveling expenses from the funds of the Society.

CHAPTER VI

OFFICERS

Section 1 (Additional)

He shall call at least one meeting of the Executive Committee of the Council between Council meetings and may call more meetings if he so desires.

Section 2 In the absence of the President, the Vice President shall perform all the duties of the President, and in the absence of both, the senior Vice President *ex officio* in point of membership shall perform the duties of the President.

Section 3 The President Elect shall assist the President in the performance of his duties in such a manner as the

President may direct and in so doing shall be considered to represent the President.

In the absence of the President Elect, the Council, at its next annual meeting, shall, upon nomination by the Nominating Committee and/or from the floor, elect a President.

Section 4 The Secretary may assign to the Executive Secretary any or all of the duties now to be enumerated, except as specified below.

The Secretary shall attend all meetings of the Society and of the Council, and shall record their respective proceedings in separate record books, and this duty he may not assign.

He shall cause to be engrossed and shall sign the diplomas of new fellows if satisfied that they have met the requirements of sections 1 and 2 of chapter 1, and shall issue all diplomas and certificates of fellowship. He shall notify individual fellows, in appropriate instances, of votes by the Council granting permission, as the case may be, to retire, to resign, to change district membership, to have dues remitted, or of votes depriving them of the privileges of fellowship, and these duties he may not assign.

He shall act *ex officio* as secretary of all boards of trial, and this duty he may not assign.

He shall have custody of the seal of the Society and of all books, papers, manuscripts, prints and paintings belonging to the Society, except such as are in charge of the Treasurer, and this duty he may not assign.

He shall act *ex officio* as secretary of the Board of Supervisors and of the Committee on Publications and the Committee on Ethics and Discipline, and shall keep the records of each in a separate volume. He shall have custody of all records as thus kept.

He shall issue notices of the meetings of the Council. One month before the annual meeting of the Society he shall issue to every fellow a program which shall contain: (a) notification of the time and place of the annual meeting, (b) notification of the stated meetings of the Council for the year, and the meetings of the boards of censors, (c) information concerning the payment of assessments, and the distribution of publications.

He shall record the proceedings of the Council and of the Society. He shall keep a complete list of the fellows of the Society, with their addresses so far as known. He shall transfer fellows from one district to another under the terms of chapter III, section 2, and shall report to the Society at its annual meeting the changes in membership of the Society during the year.

He shall conduct the official correspondence of the Society, and shall notify officers, delegates, and members of the committees of the general Society of their appointments and of their duties.

Under the direction of the Committee on Publications he shall issue at such intervals as may be determined by the Council a directory of officers and fellows of the Society, which shall be furnished upon request to fellows who are not in arrears.

He shall perform such other duties as the Society or the Council may require.

Section 5 The Executive Secretary shall be chosen by the Executive Committee of the Council upon nomination by the President. He shall hold office for one year or until his successor has been duly elected.

He shall perform such duties as are assigned to him in section 4 of this chapter and by the Executive Committee. In general, he shall assist the officers of the So-

ciety and such standing and other committees as may request his services, and his preoccupation shall be the service of the Society.

He shall attend all meetings of the Council and, on request, attend the meetings of the Executive Committee of the Council, but shall not vote in either.

The Executive Secretary need not be a fellow of the Society and nothing in this section shall forbid the choice of a woman for the office.

APPENDIX NO. 16

ATTENDANCE

BARNSTABLE	MIDDLESEX SOUTH
M. E. Champion	E. W. Barron
	W. B. Bartlett
BERKSHIRE	B. F. Conley
J. J. Boland	H. G. Giddings
	C. E. Mongan
BRISTOL NORTH	E. F. Ryan
F. H. Dunbar	W. N. Secord
	NORFOLK
BRISTOL SOUTH	J. D. Adams
G. W. Blood	Carl Bearse
E. D. Gardner	F. P. Denny
	H. M. Emmons
ESSEX NORTH	J. C. V. Fisher
R. C. Norris	Susannah Friedman
E. S. Bagnall	D. L. Lionberger
H. R. Kurth	T. F. P. Lyons
F. W. Snow	J. P. Treanor, Jr.
C. F. Warren	N. A. Welch
	SUFFOLK
ESSEX SOUTH	A. A. Hornor
B. B. Mansfield	C. S. Butler
W. G. Phippen	David Cheever
J. R. Shaughnessy	M. H. Clifford
	R. L. DeNormandie
FRANKLIN	Channing Frothingham
H. G. Stetson	John Homans
	E. P. Joslin
HAMPDEN	T. H. Lanman
E. P. Bagg	J. P. Monks
G. D. Henderson	R. N. Nye
M. W. Pearson	F. R. Ober
	Helen S. Pittman
MIDDLESEX EAST	E. F. Timmins
J. H. Blaisdell	Shields Warren
R. R. Stratton	WORCESTER
	J. M. Fallon
MIDDLESEX NORTH	WORCESTER NORTH
D. J. Ellison	E. A. Adams
F. L. Gage	H. C. Arey
A. R. Gardner	C. B. Gay
E. O. Tabor	J. C. Hales
M. A. Tighe	

APPENDIX NO. 17

REPORTS OF COMMITTEES TO CONSIDER PETITIONS FOR RESTORATION TO THE PRIVILEGES OF FELLOWSHIP

Restoration to fellowship, with the usual provision regarding payment of dues, was recommended for the following ten former members:

Edward T. Abrahams, Pittsfield (Committee: Charles T. Leslie, Modestino Criscitiello, Jr., and I. S. F. Dodd).
 Elmer J. Beaulieu, Whitman (Committee: Walter H. Pulsifer, Joseph H. Dunn and Alfred C. Smith).
 Joseph J. Carella, Quincy (Committee: Charles S. Adams, T. Vincent Corsini and Alfred V. Mahoney).
 L. W. Darrah, Northampton (Committee: Justin E. Hayes, Michael E. Cooney and Joseph R. Hobbs).
 Harry J. Hagerty, Worcester (Committee: John H. Hartnett, Peter A. Colberg and Julius J. Tegelberg).
 Morris J. Ritchie, Westfield (Committee: Archibald J. Douglas, Edward S. Smith and Robert M. Marr).
 Joseph Rosenthal, Roxbury (Committee: Sidney H. Weiner, Hyman Morrison and Joseph Laserson).
 Kent T. Royal, North Brookfield (Committee: James C. Austin, Milman Pease and Thomas J. O'Boyle).
 Robert V. Schultz, New York City (Committee: Joseph D. Ferrone, Oliver G. Tinkham and M. Fletcher Eades).
 Honoria K. Shine, Holyoke (Committee: Edward P. Bagg, George D. Henderson and Patrick E. Gear).

APPENDIX NO. 18

COMMITTEES APPOINTED TO CONSIDER APPLICATIONS FOR RESTORATION TO FELLOWSHIP

The following committees were appointed to consider the petitions for restoration to fellowship of the following four former members:

For Anthony P. Carogana, Chelsea:
 William J. Brickley, Judson A. Smith and Walter E. Garrey.
 For William R. Hill, Brookline:
 Charles J. Kickham, James A. Hennessey and Robert J. Donovan.
 For Charles H. Hogan, Salem:
 Charles L. Curtis, Thomas F. Henry and Stuart N. Gardner.
 For Arthur J. Taveira, New Bedford:
 Frank M. Howes, Edwin D. Gardner and Curtis C. Tripp.

APPENDIX NO. 19

LETTER FROM DR. HERBERT MARGOLIS

Because of certain practices now prevalent in Massachusetts, children who go to private dentists' offices for treatment, and whose parents finance such work, are penalized in regard to school attendance records. It is a common practice to send from six or eight to a busload of children from a school to a free or publicly financed dental clinic, allowing these children to be away from school an entire morning, although each one is operated upon for only twenty minutes to three quarters of an hour at the most. These children are considered to be in attendance at school during this time and are not marked absent. The school curriculum is so arranged that they lose nothing in lessons through this long absence.

In contrast to this, if a child presents a dental appointment card and asks to be excused from school to keep

an appointment in a nearby dentist's office this child is marked absent, and many times school superintendents and teachers are very much annoyed by this practice and make it unpleasant for the child.

The Oral Hygiene Council of Massachusetts believes that something should be done about this. We have considered legislation, but this seems inadvisable. It has been suggested that it would be better to work amicably through school departments gradually to change this attitude in local schools. We should like to start in Boston and be able to use Boston as an example to other localities. We understand that there is a regulation of the Boston School Committee which permits children to attend clinics and hospitals without being considered absentees. The Oral Hygiene Council would like to suggest to them that they

change this rule so that it would excuse a child for medical and dental service which, of course, covers private medical and dental service as well as clinic and hospital service.

Since this rule mentions medical as well as dental service, would the Massachusetts Medical Society go on record as joining with the Oral Hygiene Council in requesting the Boston School Committee to make this change in their regulations? Will you kindly present this to the councilors at their next meeting, and notify us of their decision in the matter?

HERBERT MARGOLIS

Oral Hygiene Council of Massachusetts
Boston

MEDICAL PROGRESS

PSYCHIATRY

Pharmacologic Shock

VERNON P. WILLIAMS, MD*

BOSTON

ALTHOUGH insulin and Metrazol shock therapy in the psychoses continues, results have been reported far less prolifically than in previous years. No doubt this is in part owing to the fact that the percentages of remissions, recoveries and improvements have not been large enough to support the original enthusiasm for such therapy, and consequently such treatment is not being conducted on so large a scale as in the past. Furthermore, it is still true that more time must pass before the remissions obtained can be adequately balanced prognostically against the percentages of remissions in cases not treated by shock therapy.

Read,¹ of the Elgin (Illinois) State Hospital, reporting on the status of 386 schizophrenic patients at least twelve months after the completion of Metrazol or insulin treatment, states that the percentage of mental improvements was less than that claimed for spontaneous remissions. In writing on insulin treatment of 76 cases of schizophrenia in China,—most of the patients being Chinese,—Halpern² says, "A higher percentage of patients in China, compared with those in western countries, proved to be unfit for insulin shock treatment. Observations point more to climatic than to racial differences." Complications making the treatment impossible occurred during an especially hot season. Bateman and Michael,³ reporting on shock treatment of schizophrenia in Ohio state hospitals since 1937, consider that the results

justify the continued use of insulin shock in patients whose illness has been less than two years

LOBOTOMY

However divided opinion may be about the value of the pharmacologic treatment of the major psychoses, the attack on them with specific, tangible, physical agents continues unabated. The surgical procedure of lobotomy, the undercutting of certain areas in the frontal lobes of the brain, has been found to give relief in cases of agitated depression. This operation, originally performed by Moniz⁴ in Portugal, has been done in the United States, particularly by Freeman and Watts⁵ and Lyster.⁶ The criticism of this drastic treatment is that patients who undergo it, though freed from their almost unbearable tension and depression, are apt to be left with a marked inertia and striking deficit in constructively directed energy and interest. It is generally agreed that the operation should be reserved for patients well past middle age whose chance of spontaneous recovery seems negligible. Also, as Cobb⁷ points out it should be remembered that the operation may leave scar and necrotic tissue that can later cause epilepsy.

ELECTRIC SHOCK

The desire to do something for patients suffering with psychoses is, of course, commendable, but the recently initiated electric shock therapy

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does not seem to stand on a soundly worked-out scientific basis. Comparatively little has been published so far about this treatment, but its modern application began with the work of Cerletti and Bini⁸ a few years ago. It has recently been instituted in numerous hospitals in this country, but apparently patients have been subjected to electric currents of various voltages without the estimation first, by animal experimentation, of the extent of possible injury or damage to the nervous system. Berkwitz,⁹ reporting the results obtained in treating over 1000 schizophrenic patients with the faradic current, says, "Electric convulsive therapy is now being introduced as a substitute for Metrazol convulsive shock therapy, but whether it is safer has not yet been established." He adds that the beneficial results parallel those noted with other forms of shock therapy.

Sogliani¹⁰ reports that he has found electric shock therapy effective in long-standing cases of depressive psychosis. But it must be said of this treatment, as of pharmacologic shock, that it has not been used long enough to determine its ultimate value.

ANOXIA FOR THE PSYCHOSES

Physiologic investigations with insulin and Metrazol therapy suggest that the drugs may produce their ameliorative effects through the mechanism of cerebral anemia. Consequently, anoxia, produced by the inhalation of nitrogen or nitrous oxide, has been introduced as another method in treatment of the psychoses. To date this work has not been extensively reported. Fogel and Gray¹¹ have used nitrous oxide in 24 cases of schizophrenia. In 10 of these patients, whose illness was of one year or less in duration, remissions or improvement occurred in 70 per cent. Improvement was less satisfactory in patients whose illness had existed for two to five years, and 4 patients whose psychoses had persisted for longer than five years showed no improvement. These investigators point out the well-known fact that there is danger of permanent injury to the cortex from nitrous oxide inhalation.

Green and Adriani¹² report practically no improvement in a series of 24 patients who were treated with inhalations of nitrogen. Nineteen of these cases were diagnosed as schizophrenia, 4 as manic-depressive psychosis, and 1 as anxiety neurosis. In general the duration of the psychosis should not be a factor in the result.

PSYCHOLOGIC INFLUENCES

The fascinating problem of how much human behavior is dependent on so-called "psychologic"

forces acting from without on the organism or personality is always present for the psychiatrist. When a person reacts this way or that, under the influence of another person or in a situation of emotional importance to him, it can always be safely argued that he would have reacted differently if he had been constituted differently. It cannot be claimed, however, as conceivable that any human being ever existed with such an impregnable constitution that he would be unresponsive to all environmental, emotional or psychologic influences. Such a human being would have to develop without a brain-stem, and to date biologic forces have not produced such a human animal. Even among doctors, who should have a proclivity for scientific thinking, there is a tendency, on the one hand, to see all disease and behavior as being "organically" determined, and on the other, to think of them as being primarily caused or induced by intangible psychologic and emotional drives, conflicts or frustrations.

The truth, so far as is known, is that mind and matter are one. A certain reaction, say of fear, may be initiated within the body because of retinal stimulation by light waves from an external object or because of sound waves stimulating the auditory nerves. And in some cases physiologic malfunctioning within one or another or various systems of the body may produce abnormal physical or mental reactions.

It is with this conception in mind that the schizophrenic reaction might be considered. It is possible and probable that certain persons, because of hereditary or endogenous defect, will develop a schizophrenic psychosis, no matter what environmental influences play upon them. Others may never develop schizophrenia, either because the accidents of their environments have not been of a kind to start in them such a process or because the makings, whatever they are, of the psychosis do not reside within them.

Postle¹³ reports an interesting example of *folie à deux*, apparently illustrating the tremendous importance of one personality on another in the development of a chronic schizophrenic psychosis. When the dominant person died, the psychotic reaction, of twenty-five years' duration, cleared in the passive partner, and she made a satisfactory social recovery, which had been maintained for over two years at the time of Postle's report. It cannot, of course, be claimed that the removal by death of one psychotic person was the cause of the remission in the other, but the circumstances as reported are strongly suggestive of this. If this is so, it should not be concluded without caution

that irreversible changes of a physical nature occur in the brain of a schizophrenic patient.

An interesting example of the influence of ideas, carrying emotional significance for the patient, on functioning of body organs, is given by Faulkner.^{14,15} He reports on esophageal spasm in 13 patients. With the esophagoscope in place, he noted marked spasm or relaxation of the esophagus when he made remarks, respectively, that he knew from the patients' histories would be likely to produce either unpleasant or pleasant emotional response. Faulkner¹⁴ states also that he has seen 3 cases in which the bronchus widened or tightened in response to emotionally pleasing or disquieting suggestions.

PSYCHIATRIC EDUCATION

The importance of sound psychiatric education in medical schools and during internship training is still not adequately appreciated. The medical student is inclined to look on the required courses in psychiatry as being somewhat unworthy of serious attention, particularly since he envisions having little to do with insane people in later years. Psychiatry is likely to seem to the student a matter of keeping the insane locked up somewhere, and psychiatrists are too often thought of as being a little queer themselves, as thinking only in terms of sex and Oedipus complexes, and as being removed from the practical world of surgery and medicine.

This attitude is unfortunate, since, as every practicing doctor knows, over a third of the patients seen in hospitals or private practice require or should have psychiatric attention. The relation between personality maladjustment and the complaints for which the patient consults his doctor becomes more and more obvious, and if the doctor is not interested in or does not know how to deal with emotional problems, he will not give his patients proper service.

An admirable curriculum for psychiatric teaching and therapy has been established in the University of Colorado School of Medicine and Hospitals, under the direction of Billings and Ebaugh. As reported by Billings,¹⁶ the services of the psychi-

atric department are nicely interwoven with those of the other hospital clinics and departments.

ATTACK ON PROBLEMS OF ALCOHOL

In January, 1938, the Research Council on Problems of Alcohol was incorporated as an associated society of the American Association for the Advancement of Science. Believing that "the alcohol problem has become one of the major perplexities of our civilization," the council is to study the problem scientifically and to deal with it in the same general fashion as syphilis, tuberculosis and cancer have been attacked as major health problems.

Until the end of 1941 the council will concentrate its attention on alcoholism and the alcoholic psychoses. In connection with the plans of the council, the first number of the *Quarterly Journal of Studies on Alcohol* was issued in June, 1940. Therein are many articles of value to those interested in the problems of alcohol.

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REFERENCES

- 1 Read, C. F. Consequences of metrazol shock therapy. *Am J Psychiat* 97:667-676, 1940
- 2 Halpern, F. G. Insulin shock treatment of schizophrenia. *Am J Psychiat*, 96:1153-1165, 1940
- 3 Bauman, J. P. and Michael, N. Pharmacological shock treatment of schizophrenia: statistical study of results in Ohio state hospitals. *Am J Psychiat* 97:159-67, 1940
- 4 Moniz, E. Les premières tentatives opératoires dans le traitement de certaines psychoses. *Encephale* 31 (Part 2) 1-29, 1936
- 5 Freeman, W. and Watts, J. W. Interpretation of functions of frontal lobe based upon observations in forty eight cases of prefrontal lobotomy. *Yale J Biol & Med* 11:527-539, 1939. Prefrontal lobotomy in treatment of mental disorders. *South M J* 30:23-31, 1937
- 6 Lyle, J. G. Transection of deep association fibers of prefrontal lobes in certain mental disorders. *South Surgeon* 8:426-434, 1939. Prefrontal lobotomy in involuntional melancholia. *J Florida M A* 25:225-229, 1938
- 7 Cobb, S. Review of neuropsychiatry for 1940. *Arch Int Med* 66:1341-1354, 1940
- 8 Carls, U. and Bini, L. L'elettroshock. *Poliedrico (sez prat)* 45:1261-1263, 1938
- 9 Berkwitz, N. J. Faradic shock in treatment of functional mental disorders. *Arch Neurol & Psychiat* 44:760-775, 1940
- 10 Sogliani, G. Eine neue Methode der Krampftherapie: die Elektroshocktherapie. *Deutsche Zeitsch f Nerven* 149:159-168, 1939
- 11 Fogel, E. J. and Gray, L. P. Nitrous oxide anoxia in the treatment of schizophrenia. *Am J Psychiat* 97:677-685, 1940
- 12 Green, W. F. and Adelman, J. Effects of anoxia induced by nitrogen inhalation in treatment of psychoses. *Arch Neurol & Psychiat* 41:1022-1030, 1940
- 13 Postle, B. Folie à deux: report of a case of remission from a psychosis of more than twenty five years' duration. *Arch Neurol & Psychiat* 41:372, 1940
- 14 Faulkner, W. B., Jr. Objective esophageal changes due to psychic factors. *Am J M Sc* 200:796-803, 1940
- 15 *Idem*. Severe esophageal spasm: an evaluation of suggestion therapy as determined by means of esophagoscope. *Psychosom Med* 2:139, 1940
- 16 Billings, E. G. Liaison psychiatry and intern instruction. *J A Am M Coll* 14:375-385, 1939

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27091

PRESENTATION OF CASE

A fifty-two-year-old woman entered the hospital complaining of crampy abdominal pain and vomiting of three weeks' duration.

The patient was seen for the first time approximately nine months before admission, when she complained of frequency, urgency and burning on urination, with a nocturia of four to five times. Further, she suffered from cramplike suprapubic pain during and immediately after urination. These symptoms had appeared three months previously and gradually increased in severity. She was admitted to this hospital, where examination of the urine showed a + test for albumin, with 20 red and 20 white cells per high-power field, and a culture yielded an abundant growth of colon bacilli. Cystoscopic examination showed a small, delicate, papillary growth with exceedingly fine fronds situated near the left ureteral orifice. The bladder was moderately inflamed, with a little yellow exudate adherent to the wall high up on the base. The growth was destroyed completely with the coagulating current and Bugbee electrode. Postoperatively the infection rapidly disappeared with sulfanilamide therapy, and the patient was discharged one week after admission.

Five weeks later the urine became cloudy and full of pus and blood. Cystoscopic examination showed the area previously occupied by the tumor to be covered with a little superficial slough, but there was no visible tumor. Above this, however, in the dome of the bladder was a rough irregular area, 1.5 cm. in diameter, which was ulcerated and had the appearance of cancerous infiltration. A biopsy from this point was reported as carcinoma (unsatisfactory for grading). Operation was advised but refused. During the next month the patient received 8400 r of supervoltage radiation, and two weeks later the urine was clear, the patient symptom-free and cystoscopic examination showed marked regression of the tumor. An additional 3600 r of external radiation was administered over the next ten days, and one week later no tumor could be seen in the bladder, the area being occupied by a flat, yellowish, irregular area that grossly resembled a scar from radiation reac-

tion. At no time was there palpable thickening of the bladder base on rectal or vaginal examination. Cystoscopic examinations five weeks and three months later showed pallor of the bladder mucosa and reduction in capacity, but no sign of tumor. Three weeks before entry the patient developed a crampy, upper abdominal pain accompanied by frequent vomiting. These symptoms grew steadily worse, and during the few days preceding admission she was unable to retain any food and constipation developed.

The patient had had scarlet fever at four years of age, an appendectomy and uterine suspension twenty-three years before admission, a right simple mastectomy for a benign tumor three years later, and a right mastoidectomy eighteen years before admission. One sister had died of carcinoma of the breast at fifty-two. The patient's husband had died of tuberculosis twenty-three years previously, and two children had died of tuberculosis of the kidneys at one and two years of age respectively.

On examination the patient was acutely ill and dehydrated. Examination of the heart and lungs was negative; the blood pressure was 120 systolic, 78 diastolic. The abdomen was distended and slightly but diffusely tender, with active peristalsis.

The temperature was 97°F., the pulse 130, and the respirations 25.

Examination of the urine showed a + test for albumin, an olive sugar reaction and a +++ test for acetone. The sediment contained an occasional granular and hyaline cast, with 3 red blood cells and 5 white blood cells per high-power field. Examination of the blood showed a red-cell count of 4,650,000 with a hemoglobin of 16.1 gm. (photoelectric-cell technic), and a white-cell count of 4300 with 70 per cent polymorphonuclears.

Plain x-ray films of the abdomen showed one gas-filled loop of intestine in the left upper quadrant, which had the appearance of jejunum. This loop was not dilated.

The day after admission a laparotomy was performed.

DIFFERENTIAL DIAGNOSIS

DR. ERNEST M. DALAND: We are not told whether there was a biopsy at the time of cystoscopy. The description of the growth is interesting. It was a small "delicate" papillary growth with exceedingly fine fronds. I think they mean to tell us that this was a papillary growth that was not suggestive enough of cancer to warrant biopsy. The story is characteristic of papillary growths in the bladder. One area was destroyed, and a short time later another area was found, which proved

to be cancer. The first lesion was near the ureteral orifice, and the second was in the dome.

Two weeks after irradiation was started there was marked regression of the tumor. That is an exceedingly good sign and may be interpreted as evidence of a sensitive tumor, which probably will be taken care of by x-ray irradiation before the cycle is finished. At the end of about three weeks the tumor had entirely disappeared. The patient had a good deal of x-ray therapy, — 8400 plus 3600 r, — and we have reason to suspect that there may have been a great deal of reaction around the site of that tumor.

Cystoscopic examinations five weeks and three months later showed pallor of the bladder mucosa and reduction in capacity, but no sign of tumor. One recalls that the tumor had been 15 cm in diameter. One would hardly expect that destruction of that tumor alone would be enough to cause reduction in capacity of the bladder unless there were a good deal of inflammatory reaction around it.

"... during the few days preceding admission she was unable to retain food and constipation developed." I wonder what they meant by constipation; it usually means either difficulty in or lack of bowel movements. She had been vomiting everything eaten for the last few days and had had no food, and I therefore think that bowel movements could hardly be expected. They do not tell us whether the peristalsis was high pitched or not.

We have, then, a patient with a long-standing story of obvious intestinal obstruction, and three weeks of vomiting and abdominal pain. The pain was in the upper abdomen, and that usually points to small bowel obstruction. She was very much dehydrated, as evidenced by the high red-cell count and the high hemoglobin. The white-cell count of 4300 shows that there was probably no interference with the blood supply of the bowel.

May we see the x-ray films?

DR GEORGE W. HOLMES. These films, which I presume are the ones Dr. Daland is interested in at the moment, show the loops of gas filled small bowel. I should not think that they were particularly dilated, although they are perhaps a little large. From the story we have just heard, one might expect much more dilatation than these films show. There is very little gas in the large bowel, which is of some importance, pointing toward obstruction in the small bowel. The kidney outlines are distinctly seen on both sides and are normal in shape, so that the patient did not have hydronephrosis, and there is no evidence of metastasis to the bones of the spine.

DR. DALAND. We have, then, an intestinal obstruction, probably of the small bowel. We must consider the possibility of a cancerous implant, metastatic in the small bowel, with obstruction. We must consider an implant in the terminal ileum, with an intussusception, but nothing is said about any palpable mass in the region of the ileocecal valve. We might have obstruction by a gallstone, but I think that is unlikely. We might have an independent new growth of the small bowel, but carcinomas of the small bowel are quite rare. Lymphomas are a little commoner than carcinomas, but here we have a patient who has had a known carcinoma of the bladder and a great deal of irradiation, with undoubtedly a good deal of reaction around it. We cannot expect x-rays focused on the wall of the bladder to destroy a lesion in this short time without getting a certain amount of reaction throughout the wall of the bladder and in the adjacent structures. We do have to consider very strongly the possibility that a loop of bowel got stuck to the bladder or the peritoneum over the bladder, producing a partial obstruction. With a white-cell count of 4300 and a normal temperature, there was probably no gangrenous loop or much free fluid. My diagnosis, then, is small bowel obstruction, probably in about the mid ileum, caused by adherence of the bowel to the peritoneum over the bladder at the site of the x-ray treatment.

DR. FLETCHER COLBY. I thought very much as Dr. Daland does: that this woman apparently had obstruction of some portion of the bowel as a result of the large amount of irradiation she had had. This was an acute episode that came on several months after irradiation.

The only other thing that I have to add is that the patient did have a malignant tumor of the bladder, proved by biopsy. She has been cystoscoped at regular intervals since irradiation and has had no recurrence, although her bladder is of somewhat smaller capacity than normal.

DR. CLAUDE WELCH. The three diagnoses that Dr. Colby and I considered in this case were radiation necrosis of the lower small bowel with obstruction, some obstruction from bands around the site of the previous abdominal operation, and extension from carcinoma of the bladder involving the small bowel. Much to my surprise, there was a carcinoma of the transverse colon about the size of my thumbnail and bound down to the left side of the bladder at exactly the spot where she had been receiving all the irradiation. That had been present with absolutely no gas visible by x-ray study of the ascending colon. The

patient's progress was satisfactory following the resection.

PREOPERATIVE DIAGNOSIS

Intestinal obstruction.

DR. DALAND'S DIAGNOSIS

Intestinal obstruction, due to loop of ileum adherent to radiated area in bladder.

ANATOMIC DIAGNOSIS

Adenocarcinoma of the transverse colon.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: The diagnosis of post-radiation reaction was certainly a very reasonable one to make in this case. We have seen several cases in which an adherent loop of bowel in the field of radiation has developed a severe reaction, in the course of which the bowel wall has become markedly thickened by fibrous tissue. These cases present obstructive symptoms in spite of the fact that the lumen of the bowel may not show much stenosis. The carcinoma found by Dr. Welch was a typical primary adenocarcinoma of the cecum. Here is a case in which we have three entirely different neoplasias: a tumor of the breast ten years before admission, cancer of the bladder and then a cancer of the large bowel. It is rather interesting that this tumor, which was adherent to the bladder, must have been in the field of radiation. The bladder tumor was apparently cured by the supervoltage radiation, but the intestinal tumor, which must have received identical dosage so far as we could make out, was not touched by it. This is, of course, in line with our clinical experience that radiation therapy of intestinal carcinomas is a waste of time. It is seldom that one has so well-controlled an observation as this.

DR. HOLMES: Did the normal bowel in the field of radiation show any reaction?

DR. WELCH: There was marked thickening—up to 2.5 cm.—of the transverse mesocolon, which made the operative procedure a little different from that ordinarily employed, because no anastomosis could be thought of in that tissue. The same reaction was still present when the patient was operated on about two months later for closure of the fecal fistula.

DR. MALLORY: You found nothing to indicate that there was ever any small-bowel obstruction?

DR. WELCH: No; it was thoroughly examined and perfectly free all the way through.

CASE 27092

PRESENTATION OF CASE

A fifty-two-year-old housewife entered the hospital complaining of vomiting of three weeks' duration.

The patient was treated in this hospital for the first time eight years before admission, when a complete hysterectomy, bilateral salpingo-oophorectomy and appendectomy were performed. The pathological report was chronic endocervicitis and endometriosis of the appendix. X-ray findings in the chest at the time were those of healed bilateral apical tuberculosis. She was seen again three years before admission, and complained of nervousness, fatigue, weakness, indigestion, nocturia and dysuria, but examination was negative. One year before admission the patient came to the Out Patient Department complaining of constipation, gas in the stomach, insomnia and nervousness and stated that she had had two small hemoptyses two months previously. A gastrointestinal series showed a small hiatus hernia of the esophagus. The stomach filled well, with normal relief; the pylorus opened readily, filling a normal cap and duodenum. The head of the motor meal lay in the transverse colon, the tail in the terminal ileum. A film of the chest showed slight mottling in the right apex. The heart shadow was in the upper limits of normal, the aorta was tortuous but normal, although there was questionable widening in the oblique view. Pulsations were strong, even out into the lung roots, and a Corrigan type of pulsation was suggested. Ten months before admission, after taking a "nerve tonic," the patient coughed up "a few drops of blood." She went to another hospital, where x-rays were taken and admission was advised but declined. X-ray studies were repeated five months before admission, and she was told that she had tuberculosis, with a positive sputum. One month before admission, the patient entered the above hospital, where x-ray examination showed "no germ and no effect on the lungs." On the fifth hospital day vomiting developed and became a persistent symptom. In addition she became "deep yellow in color for two to three weeks." Vomiting usually occurred in small amounts every two or three hours, but occasionally it ceased for as long as three days, after which "a bucketful" was expelled. The patient left the hospital within three weeks and went home to bed, where her physician administered a series of about thirty "liver injections." She entered this hospital a few days after the last injection.

On examination the patient was in shock and

vomiting foul, blackish fluid almost constantly. The pupils were constricted, the extremities cold and clammy; and the skin had a slightly icteric hue, but no other abnormal pigmentation. The heart sounds were somewhat distant, but otherwise normal; the blood pressure was 120 systolic, 80 diastolic, but could not be obtained shortly after admission; the pulse was just perceptible. Examination of the lungs was negative. The abdomen was held in protective spasm, but no masses could be felt other than the liver, which was palpable three fingerbreadths below the costal margin. Pelvic examination was negative. The reflexes were sluggish, but equal; Trousseau's sign was positive.

The temperature was 101.8°F, the pulse 120, and the respirations 20.

Examination of the urine showed a +++ test for albumin, with occasional hyaline and granular casts and 5 red blood cells and 20 white blood cells per high power field in the sediment. Examination of the blood showed a red cell count of 4,240,000 with a hemoglobin of 8.3 gm (photoelectric-cell technic), and a white-cell count of 21,600 with 85 per cent polymorphonuclears. The red cells showed achromia, with variation in size and shape; 2 per cent were nucleated. The nonprotein nitrogen of the blood serum was 60 mg per 100 cc, the chloride 101.5 milliequiv per liter, and the carbon dioxide combining power 26.3 milliequiv. A blood Hinton test was negative. The stools were normal, and the vomitus contained no free hydrochloric acid and was guaiac negative.

With a gastrointestinal series the stomach contained a 90 per cent residue of barium, together with a large amount of secretion six hours after a motor meal. The stomach was grossly dilated, and there was dilatation of the pyloric valve and duodenum around to the third portion, where there was a marked constriction. It was not possible to examine this area in a satisfactory manner because of the dilute barium. In the films, however, there was a suggestion of a polypoid defect just beyond the area of narrowing.

The patient was given two 500-cc blood transfusions and intravenous glucose and physiologic saline solutions, but continued to vomit large quantities. Three days after admission she became drowsy. The urinary output never rose above 100 cc, and averaged 250 cc; the nonprotein nitrogen rose to 90 mg per 100 cc, and the vomitus became guaiac positive. On the fourth hospital day a jejunostomy was performed under local anesthesia, but because of inadequate exposure no evidence of tumor or cause for duodenal

obstruction could be found; the chloride was 110 milliequiv, and the carbon dioxide combining power 36.8 milliequiv per liter. The next day, drowsiness increased, and at times the patient became irrational; the temperature rose to 104°F. The reflexes were very active, and involuntary twitchings of the jaw and extremities occurred. The nonprotein nitrogen was 85 mg per 100 cc, the protein 4.9 gm, the chloride 99.5 milliequiv per liter, and the carbon dioxide combining power 31.5 milliequiv. One week after admission the temperature again rose to 104°F, and the pulse and respirations became elevated. The left chest was dull to percussion below the sixth dorsal vertebra posteriorly, with scattered areas of bronchial breathing and occasional dry crackling rales throughout both lungs. The abdomen was distended, peristalsis was absent, and there was tenderness with marked spasm in the left flank. Despite oxygen therapy and another blood transfusion, the patient died the next day.

DIFFERENTIAL DIAGNOSIS

DR E PARKER HAYDEN This history suggests several possible causes of intestinal obstruction. The patient had had a previous abdominal operation. She had tuberculosis. She had had endometriosis. Any one of these might be the cause of her later obstruction.

We do not know whether the protective spasm was voluntary, or whether it was true spasm, suggesting peritonitis. If she had an advanced peritonitis with much spasm, it would probably be difficult to feel the liver.

The description of a polypoid defect in the x-ray film, of course, suggests a tumor, but this appearance might be due to a gallstone impacted in the duodenum. Apparently there were no positive operative findings, the patient's condition probably rendering extensive exploration unwise, and the surgeon restricted himself to a jejunostomy under local anesthesia to relieve what was evidently a very high obstruction in the third portion of the duodenum near the tail of the pancreas, possibly in relation to the stomach or transverse colon.

The first diagnosis that occurred to me was that of carcinoma of the duodenum. Cancer of the duodenum is very uncommon, however, and when present is apt to be in the region of the papilla, whereas the obstruction here was obviously farther down, near the end of the duodenum. I shall therefore discard this diagnosis. Another possibility is secondary involvement of the duodenum by a cancer arising elsewhere. Cancer of the pancreas, for example, will sometimes invade the duodenal wall and produce obstruction. The evidence

is insufficient to rule this possibility either in or out.

The jaundice several weeks before entry, if it was true jaundice, could, of course, have been due to obstruction of the common duct prior to rupture of a gallstone into the duodenum. It could have been caused by metastatic disease of the liver, or by carcinoma of the pancreas, but since the jaundice was very slight on admission, whereas previously it had been pronounced, a stone would best explain that sequence of events.

There seems no doubt that the patient had tuberculosis, and therefore the possibility of a tuberculous lesion of the bowel with obstruction must be considered. I have never seen such a lesion in the duodenum or upper jejunum, but I should think it could exist. It seems that perforation had occurred, presumably at the obstructing point, perhaps to produce an abscess either in the lesser peritoneal cavity or in the left upper quadrant, probably with subsequent generalized spread of the peritonitis.

The whole picture may have been due to tuberculosis, with development, toward the end, of a tuberculous meningitis accounting for the various nervous symptoms, with terminal pneumonia and death. I think it is anybody's guess whether this patient's obstruction was due to a tuberculous stricture or to carcinoma of the duodenum. In all probability, it was not a gallstone. In view of the known presence of tuberculosis, I am making a first diagnosis of a tuberculous stricture involving the small bowel, although the observation of a polypoid defect, unless due to a fecalith, does not fit this diagnosis.

DR. AUBREY O. HAMPTON: I think we can be perfectly certain that the obstruction was in the duodenum, in the third portion behind the stomach. Even though the barium is dilute, one can make out in the duodenum a round defect that looks like a round polypoid tumor, not like an inflammatory lesion. I think that we must rule

out gallstone. There is no evidence that a stone had perforated into the duodenum from the gall bladder.

CLINICAL DIAGNOSES

Duodenal obstruction.

Peritonitis, acute?

Uremia.

Bronchopneumonia.

DR. HAYDEN'S DIAGNOSIS

Tuberculous stricture of the duodenum, with perforation and peritonitis.

ANATOMIC DIAGNOSES

Carcinoma of the duodenum.

Peritonitis, generalized.

Bronchopneumonia.

Pulmonary tuberculosis, healed apical, bilateral.

Operative wound: jejunostomy.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: The post-mortem examination in this case showed a primary carcinoma of the terminal portion of the duodenum, just edging over into the first part of the jejunum and lying directly behind the ligament of Treitz. It was a polypoid growth, with little invasion of the wall, and was evidently of a low grade of malignancy. Its location would have made resection difficult, but if one could have avoided the blood vessels in the root of the mesentery, it might have been possible at an earlier stage before the obstructive symptoms became so severe. The patient came in, obviously, almost moribund. Following the jejunostomy, general peritonitis developed. There were 2000 cc. of foul purulent fluid in the peritoneal cavity. The only other findings of significance were a rather extensive but inactive tuberculosis of the lungs and a terminal bronchopneumonia.

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
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SUBSCRIPTION TERMS: \$6.00 per year in advance postage paid for the United States Canada \$7.04 per year Boston funds (including war-exchange tax) \$8.52 per year for all foreign countries belonging to the Postal Union

MATERIAL for early publication should be received not later than noon on Saturday

THIS JOURNAL does not hold itself responsible for statements made by any contributor

COMMUNICATIONS should be addressed to the *New England Journal of Medicine* 8 Fenway Boston Massachusetts

GRADUATE MEDICAL EDUCATION AND DEFENSE

THIS nation, as well as all others, stands at the crossroads. Each is in dire peril. Under such circumstances, the general health of the nation is of the utmost importance. Those who protect this national health—the physicians and surgeons of the country—must undergo a long and arduous training before they are able adequately to undertake the task before them. When crises are at hand, there is a tendency on the part of many to rush their fences and to seek means whereby their goal may be more quickly reached. Yet the process of medical education cannot and must not be too sharply curtailed. The report of the

Commission on Graduate Medical Education* outlines in a clear and concise manner the desirable and necessary features of each of the graduate periods—the internship, the residency and postgraduate education. All those even remotely interested in the subject—and every doctor should be—ought to read this report. In essence its recommendations are covered in the following paragraphs.

The internship, which rounds out the medical-school course and gives to it practical application, should train men for general practice,—even though a man intends to enter a specialty,—should be at least eighteen months long and should be so designed that the intern will have considerable responsibility under adequate supervision. The short, rapidly rotating type of service is considered unsound.

The residency, which prepares a man for the practice of a specialty,—and which perforce is preceded by an adequate internship,—should, according to the Advisory Board of Medical Specialties, be of at least three years' duration and should include some advanced training in the basic medical sciences. The committee believes that unless these requirements are met physicians may "find it difficult to complete their training and yet will be tempted to practice their chosen specialty in spite of their incomplete preparation."

True postgraduate education, which may come at any subsequent period of a doctor's career, should aim to keep him abreast of current knowledge and should teach what of the old should be discarded and what of the new is worth embracing. It should not—in the committee's opinion—be designed to qualify a physician for entering a specialized field of practice. It should be remembered, however, that postgraduate education is divided into two independent categories, which should clearly be differentiated, namely, that designed for the instruction of general practitioners and that designed for those already qualified as specialists. The committee further very properly recommends that such instruction be given only

**Graduate Medical Education*. Report of the Commission on Graduate Medical Education. 304 pp. Chicago: University of Chicago Press, 1940.

by those duly qualified and that it should be coordinated by "existing agencies in each state that are concerned with the health and medical care of the population."

With the nation's health becoming more and more important and with the increasing exigencies of military service,—both line and medical,—the recommendations of this committee should be studied carefully by all those concerned with the training of physicians and by those who may have to do with the transfer of physicians from civil to military life.

NURSING FACILITIES IN AND ABOUT BOSTON

In sickness, there can be no doubt that the nurse plays and always will play an extremely important and often an indispensable role. On this point all are agreed. Physicians, by and large, are familiar with the public and private hospital facilities available in their community; yet many are not fully cognizant of the nursing organizations ready and able at all times to supplement the physician's care in the hospital and in the home. Recently the Community Nursing Council, of Boston, has issued a *Handbook of Nursing Services in Boston*,* and therein is described briefly but adequately those nursing resources offered to the public through nonprofit institutions. The booklet outlines such services as those that may be had from the Household Nursing Association, equipped to give adequate care to patients with minor ailments and to convalescents at home, and the public-health nursing agencies, organized to carry out all phases of the public health program with services rendered to the individual, the family, the school or the business establishment. There is also described the Central Directory for Nurses, the purpose of which is to aid the medical profession and the public in obtaining efficient nursing care.

This handbook is primarily intended as a directory of nursing and allied services in Boston, and

as such it should be in the hands of all physicians of this vicinity. It is particularly to be noted that "practically every community has a visiting-nurse service, which provides nursing care in the home at a small charge or on a free basis for those unable to pay."

MEDICAL EPONYM

GRAVES'S DISEASE

Exophthalmic goiter was described by Robert J. Graves (1797–1853), of Dublin, in Lecture No. 12 in a series of clinical lectures delivered at the Meath Hospital during 1834–1835. The lecture is reported in the *London Medical and Surgical Journal* (II, 7: 513–520, 1835) under the following title: "Persesquinitrate of Iron in Chronic Diarrhoea—Blueness of the Fingers and Toes in Fever—Some Account of the Yellow Fever Which Prevailed in Dublin in 1827—Newly Observed Affection of the Thyroid Gland in Females: Its connexion with palpitation, with fits or hysteria—Erysipelas—Remarks on the Formation of Acidity of the Stomach in Indigestion—Psoriasis—Treatment by Arsenic." Apparently the subject was considered of relatively minor importance.

I have lately seen three cases of violent and long continued palpitations in females, in each of which the same peculiarity presented itself, viz. enlargement of the thyroid gland; When the palpitations were violent the gland used notably to swell and became distended. . . . The swelling immediately began to subside as the violence of the paroxysm of palpitation decreased. . . . In one the beating of the heart could be heard during the paroxysm at some distance from the bed. . . .

. . . . We may expect to observe the tumefaction of this gland also where the palpitation depends on organic disease of the heart, as in the following case detailed to me by a friend.

A lady, aged twenty, became affected with some symptoms which were supposed to be hysterical . . . it was observed that her pulse had become singularly rapid . . . being never under 120. . . . She next complained of weakness on exertion, and began to look pale and thin. Thus she continued for a year. . . . It was now observed that the eyes assumed a singular appearance, for the eyeballs were apparently enlarged, so that when she slept or tried to shut her eyes, the lids were incapable of closing. When the eyes were open, the white sclerotic could be seen, to a breadth of several lines, all round the cornea. In a few months, the action of the heart continuing with unceasing violence, a tumour, of a horse-shoe shape, appeared on the front of the throat and exactly in the situation of the thyroid gland.

R. W. B.

**Handbook of Nursing Services in Boston*. 56 pp. Boston: Community Nursing Council, 1940.

MASSACHUSETTS MEDICAL SOCIETY

COMMITTEE ON STATE AND
NATIONAL LEGISLATION

The following bills are scheduled for hearings at the State House during the week of March 3:

March 4

H. 122 (Public Health). Bill (accompanying House 120, recommendations of the Department of Public Health) relative to requiring the clerk or registrar of each city or town to give to persons who file notice of intention of marriage suitable information concerning gonorrhea and syphilis. This bill provides for premarital educational advice regarding genitoinfectious diseases. *Favored.*

H. 1234 (Public Health). Petition of Henry M. Landesman for legislation to require certificates from physicians that physical and blood-test examinations have been made by parties filing marriage intentions. This bill is adequately cared for by H. 122. *Opposed.*

H. 460 (Public Health). Petition of Leslie B. Cutler for legislation to regulate further the filing of notices of intention of marriage, the delivery of certificates of such intention and the return of unused certificates. This bill provides premarital educational advice and examination for genitoinfectious diseases. *Undecided* (favored in principle but opposed as drawn).

SECTION OF OBSTETRICS
AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

PREGNANCY IN A PATIENT WITH
RHEUMATIC HEART DISEASE

Mrs. L., a twenty-nine-year-old para II, about seven months pregnant, was sent into the hospital on August 15, 1940, because of increasing dyspnea and swelling of the ankles.

The family history was irrelevant. The patient's past history was noncontributory except for the following data directly bearing on the present illness. She had her first and only attack of rheumatic fever at nineteen years of age. Since then there had been moderate limitation of activity because of dyspnea and fatigue, but she had been able to do her own housework during seven years of married life. For two or three years before admission she had been taking digitalis most of the time because she found that this greatly reduced the dyspnea on exertion, even though the heart had a regular rhythm. Her other pregnancy ended in a miscarriage at three months a few years previously. This experience apparently had not altered her cardiac reserve.

The first six and a half months of the present pregnancy were not eventful, but two weeks before entry the dyspnea suddenly became severer, and an electrocardiogram was reported to have shown auricular fibrillation. The consultant increased the dose of digitalis, but termination of the pregnancy was not discussed. The dyspnea did not diminish, and a few days before admission the patient developed swelling of the ankles and slight nausea. During this period she had been ambulatory.

Examination on admission revealed a normally developed and well-nourished woman, sitting up in bed. There was no dyspnea at rest, and no orthopnea. The lungs were clear. The heart was slightly enlarged to percussion, and the pulmonary conus appeared to be dilated. There was a faint diastolic murmur at the apex, but no thrill. The pulse rate was grossly irregular at 90 and showed coupled beats. The blood pressure was approximately 110 systolic, 70 diastolic. The abdomen was enlarged to a size consistent with a seven months' pregnancy. There was no edema of the ankles after several hours of recumbency.

Although the dangers of allowing fibrillation to continue were realized, it was thought that the patient had probably already experienced the maximum load of the pregnancy on her circulation. It was therefore decided to allow the pregnancy to proceed for another two or three weeks, in the hope of obtaining a viable child by cesarean section, since it was believed that this would entail little more risk than immediate termination of the pregnancy. The digitalis was discontinued for two days until the signs of digitalis intoxication had subsided, and a maintenance dose of $1\frac{1}{2}$ gr. a day was then resumed. The patient was given complete bedrest, with a low-calorie diet and moderate restriction of sodium and fluids.

In spite of these measures there was a progressive increase in dyspnea, so that it was troublesome even when the patient was sitting up; her legs began to swell, even in bed. The pulse, which was about 90, was grossly irregular. No rales were heard in the lungs. On the sixth day after admission the patient was delivered by a low midline cesarean section under open-cone ether anesthesia. A viable girl was obtained, whose weight was estimated at 3 or 4 pounds. The mother stood the procedure well and showed no respiratory embarrassment at any time.

For the first five days after operation the digitalis was increased to 3 gr. a day, because the pulse had risen to 120 and was very irregular and of poor quality. On the third day the pulse, although still 120, was regular and there was no dyspnea.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

On the fifth day the pulse was regular at 80, except for occasional extrasystoles, and the digitalis was reduced to $1\frac{1}{2}$ gr. a day. The rest of the puerperium was uneventful. An electrocardiogram on the tenth day showed normal sinus rhythm except for occasional auricular extrasystoles. The digitalis was continued, however, since the patient had found, as previously noted, that she was more comfortable on a maintenance dose even with a normal rhythm. She left the hospital ambulatory on the fourteenth day after the operation. She and the baby have continued to do well, and a recent report—four months after discharge—states that she has less exertional dyspnea now than she had before the onset of the pregnancy.

Comment. This case had a fortunate outcome. A woman who for several years has had to take digitalis to carry on her daily tasks without dyspnea is not a particularly favorable risk for pregnancy. If pregnancy is undertaken, drastic reduction of daily activity must be made, or the load of pregnancy will be too much for her. In this case, at six and a half months the load of pregnancy evidently became too much for the patient, and she developed heart failure with auricular fibrillation.

In this situation, interrupting the pregnancy is now considered to be a dangerous procedure for the following reasons: there is no immediate improvement to be expected by interrupting the pregnancy; the interruption itself brings added strain on the heart at a time when the load of pregnancy is already heavy; and the load of normal pregnancy diminishes during the last few weeks. Therefore, present judgment is that it is wise not to interrupt pregnancy but to support the patient by all means until term, then allow her to have a carefully conducted normal delivery unless there are special reasons for abdominal hysterotomy. It takes a great deal of self-restraint to withhold hysterotomy in this situation, but the indications as outlined above favor this course. The decision whether or not to interrupt the pregnancy really was made before the peak load of pregnancy hit this patient. By the time the load appeared it was too late to interfere without considerable risk.

The death rate in auricular fibrillation in pregnancy in women with rheumatic heart disease is approximately 33 per cent. This includes all cases, whether interrupted or not. Undoubtedly, interruption early in pregnancy would save many maternal lives in such cases, but it should be done early.

NORFOLK MEDICAL NEWS

For many years the *Worcester Medical News* has served a useful and extremely valuable function in presenting to the members of the Worcester District Medical Society matters of local and general medical interest. It has gradually increased in size, and there is no doubt that news bulletins of this sort are extremely popular with the members of a district society of appreciable size.

The Norfolk District Medical Society, appreciative of the value of such bulletins, voted at its January meeting to publish a bulletin, and the first issue of the *Norfolk Medical News* was recently forwarded to the 900 members of the society. The editor is Dr. Carl Bearse, and the associate editors, Drs. J. C. V. Fisher, David Halbersleben, I. R. Jankelson, C. J. E. Kickham and Kathlyne S. Snow. The *Journal* welcomes the publication and extends best wishes for the continuance of its initial success.

POSTGRADUATE EXTENSION COURSES

The postgraduate extension courses are sponsored by the Massachusetts Medical Society in cooperation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau. Registration is free to all legally registered physicians of the Commonwealth. For further information the district chairman of postgraduate instruction should be consulted.

The programs for the spring sessions are as follows:

BERKSHIRE DISTRICT: PITTSFIELD

SUBJECT	DATE
Recent Advances in Medical Therapeutics:	
Sedatives; analgesics; cathartics; sulfanilamide compounds; dangerous drugs	March 6
Infections of the Hands and Feet	March 13
Dermatitis and Eczema (see below for questions to be discussed)	March 20
Chemotherapy in the Treatment of Gonococcal Infection	March 27
Diagnosis, Treatment and Prognosis of Central-Nervous-System Syphilis	April 3
Pediatric Case Discussions	April 10
Management of Abdominal Distention	April 17
Obstetric Infections: Diagnosis and treatment	April 24

Meetings to be held at the Bishop Memorial Building, Thursdays, at 4:30 p.m.

Harry G. Mellen, M.D., Chairman
150 North Street, Pittsfield

BRISTOL SOUTH DISTRICT: FALL RIVER

SUBJECT	DATE
Diagnosis, Treatment and Prognosis of Central-Nervous-System Syphilis	March 11

Recent Advances in Medical Therapeutics Sedatives, analgesics, cathartics, sulfanil amide compounds, dangerous drugs	March 18
Obstetric Complications with Case Histories and Clinical Problems	March 25
Acute Abdominal Pain Its interpretation and management	April 1
The Clinical Recognition of the Types of Jaundice and Recent Advances in Their Treatment	April 8
Chemotherapy in the Treatment of Gonococcal Infection	April 15
Diagnosis and Treatment of Minor Lesions of Rectum and Anus	April 22
Pediatric Case Discussions (patients will be shown)	April 29
Meetings to be held at the Union Hospital, at 4 30 p.m.	Tuesdays,

Howard P Sawyer, M.D., *Chairman*
68 Bigelow Street, Fall River

FRANKLIN DISTRICT GREENFIELD

SUBJECT	DATE
The Clinical Recognition of the Types of Jaundice and Recent Advances in Their Treatment	March 6
Pediatric Case Discussions	March 13
Nutritional Deficiencies and the Uses of Prepa- rations of Vitamins	March 20
Management of Abdominal Distention	March 27
Recent Advances in Medical Therapeutics Sedatives, analgesics, cathartics, sulfanil amide compounds, dangerous drugs	April 3
Obstetric Complications with Case Histories and Clinical Problems	April 10
Dermatitis and Eczema (see below for ques- tions to be discussed)	April 17
Acute Abdominal Pain Its interpretation and management	April 24
Meetings to be held at the Library of the Franklin County Public Hospital, Thursdays, at 8 00 p.m.	
Halbert G Stetson, M.D., <i>Chairman</i> 39 Federal Street, Greenfield	

HAMDEN DISTRICT SPRINGFIELD, HOLYOKE

SUBJECT	DATE
Obstetric Complications with Case Histories and Clinical Problems	March 12
Chemotherapy in the Treatment of Gonococcal Infection	March 19
Diagnosis and Treatment of Minor Lesions of Rectum and Anus	March 26
Dermatitis and Eczema (see below for ques- tions to be discussed)	April 2
Head Colds and Complications	April 9
Technic and Treatment of Primary, Secondary and Tertiary Syphilis	April 16
Pediatric Case Discussions	April 23
Recent Advances in Medical Therapeutics Sedatives, analgesics, cathartics, sulfanil amide compounds, dangerous drugs	April 30
Meetings to be held Wednesdays at the Academy of Medicine, Professional Building, 20 Maple Street, Spring	

field, at 4 00 p.m., and in the Outpatient Department of
the Skinner Clinic, Holyoke Hospital, Holyoke, at 8 00 p.m.

Alfonzo A Palermo, M.D., *Chairman*
121 Chestnut Street, Springfield

HAMPSHIRE DISTRICT NORTHAMPTON

SUBJECT	DATE
Obstetric Complications with Case Histories and Clinical Problems	March 6
Dermatitis and Eczema (see below for ques- tions to be discussed)	March 13
Technic and Treatment of Primary, Secondary and Tertiary Syphilis	March 20
Infections of the Hands and Feet	March 27
Pediatric Case Discussions	April 3
Chemotherapy in the Treatment of Gonococcal Infection	April 10
Nutritional Deficiencies and the Uses of Prepa- rations of Vitamins	April 17
Therapeutic Uses of Preparations of Endocrine Glands Thyroid gland, pituitary gland, ovary, testis and adrenal cortex	April 24
Meetings to be held in the Nurses' Home of the Cooley Dickinson Hospital, Thursdays, at 4 15 p.m.	
Robert C Byrne, M.D., <i>Chairman</i> 46 Main Street, Hatfield	

WORCESTER DISTRICT MILFORD

SUBJECT	DATE
The Treatment of Varicose Veins	March 11
Technic and Treatment of Primary, Secondary and Tertiary Syphilis	March 18
Pediatric Case Discussions	March 25
Therapeutic Uses of Preparations of Endocrine Glands Thyroid gland, pituitary gland, ovary, testis and adrenal cortex	April 1
Obstetric Complications with Case Histories and Clinical Problems	April 8
Recent Advances in Medical Therapeutics Sedatives, analgesics, cathartics, sulfanil amide compounds, dangerous drugs	April 15
Chemotherapy in the Treatment of Gonococcal Infection	April 22
Infections of the Hands and Feet	April 29
Meetings to be held in the Nurses' Home of the Milford Hospital, Tuesdays, at 8 30 p.m.	
Joseph Ashkins, M.D., <i>Chairman</i> 36 Pine Street, Milford	

WORCESTER NORTH DISTRICT FITCHBURG

SUBJECT	DATE
Chemotherapy in the Treatment of Gonococcal Infection	March 7
Therapeutic Uses of Preparations of Endocrine Glands Thyroid gland, pituitary gland, ovary, testis and adrenal cortex	March 14
Obstetric Infections Diagnosis and treatment	March 21
Technic and Treatment of Primary, Secondary and Tertiary Syphilis	March 28
The Treatment of Varicose Veins	April 4

Infections of the Hands and Feet.....	April 11
Pediatric Case Discussions.....	April 18
Dermatitis and Eczema (see below for questions to be discussed).....	April 25

Meetings to be held in the Nurses' Home of the Burbank Hospital, Fridays, at 4:30 p.m.

George P. Keaveny, M.D., *Chairman*
62 Fox Street, Fitchburg

The following questions will be discussed in the course on dermatitis and eczema:

1. Is there such a thing as eczema?
2. Is allergy fact or fiction?
3. Are skin tests of value in dermatology?
4. Are fungus infections (athlete's foot) as prevalent as we are led to believe?
5. With the diagnosis made, what should be the treatment of common cutaneous eruptions?

FACULTY FOR THE EXTENSION COURSES

Dermatology. Chairman: Dr. John G. Downing; instructors: Drs. John Adams, Jr., Leonard E. Anderson, Bernard Appel, J. Harper Blaisdell, G. Marshall Crawford, Francis P. McCarthy, Mildred L. Ryan, Jacob H. Swartz and Maurice M. Tolman.

Ear, Nose and Throat. Chairman: Dr. LeRoy A. Schall; instructors: Drs. Charles T. Porter, Lyman G. Richards and John R. Richardson.

Gonorrhea. Chairman: Dr. Oscar F. Cox; instructors: Drs. Weston T. Buddington, Sylvester B. Kelley and P. N. Papas.

Medicine. Chairmen: Drs. Chester S. Keefer and Robert T. Monroe; instructors: Drs. Fuller Albright, Clifford L. Derick, E. Stanley Emery, Eugene C. Eppinger, Marshall N. Fulton, G. Philip Grabfield, Franz Ingelfinger, Charles A. Janeway, Harold J. Jeghers, William T. Salter, Charles L. Short and Maurice B. Strauss.

Obstetrics. Chairmen: Drs. Meinolf V. Kappius and Roy J. Heffernan; instructors: Drs. Christopher J. Duncan, M. Fletcher Eades, A. Gordon Gauld, Thomas R. Goethals, James C. Janney, Foster S. Kellogg, Joseph W. O'Connor, Louis E. Phaneuf, John Rock, Judson A. Smith and Raymond S. Titus.

Pediatrics. Chairmen: Drs. Warren R. Sisson and James M. Baty. Instructors: Drs. Elmer W. Barron, John A. V. Davies, Louis K. Diamond, R. Cannon Eley, Joseph Garland, Harold L. Higgins, Lewis W. Hill, Edwin H. Place and Clement A. Smith.

Surgery. Chairmen: Drs. Howard M. Clute and Leland S. McKittrick; instructors: Drs. Hollis L. Albright, Arthur W. Allen, Franklin G. Balch, Jr., Marshall K. Bartlett, William E. Browne, Richard B. Cattell, Edward A. Edwards, Henry H. Faxon, Jacob Fine, E. Parker Hayden, Thomas H. Lanman, Robert R. Linton, Charles C. Lund, Champ Lyons, Henry C. Marble, Stanley J. G. Nowak, E. Everett O'Neil, Neil W. Swinton and Irving J. Walker.

Syphilis. Chairman: Dr. Francis M. Thurmon; instructors: Drs. William P. Boardman, Rudolph Jacoby and C. Guy Lane.

TEACHING CLINICS IN GONORRHEA AND SYPHILIS

The Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health and the

United States Public Health Service is again sponsoring teaching clinics in gonorrhea and syphilis. Registration in these teaching clinics is free; all expense of teaching is met by the sponsoring organizations. Clinic schedules are listed below; any legally registered physician in the Commonwealth may attend for one or more days.

Gonorrhea Clinics at the Boston Dispensary. These are open daily from 9:30 to 11:30 a.m., and on Monday, Wednesday and Friday evenings from 6:00 to 8:00. Dr. Oscar F. Cox is in charge. Write or telephone for additional information: Gonorrhea Clinic, Boston Dispensary, Boston.

Syphilis Clinics at the Massachusetts General Hospital. These are held in the Out-Patient Department, South Medical Service, on Tuesdays and Wednesdays from 10:00 a.m. to 12:00 noon. Dr. G. Marshall Crawford is in charge. Write or telephone for additional information: South Medical Service, Massachusetts General Hospital, Boston.

DEATHS

SUTHERLAND—JOHN P. SUTHERLAND, M.D., of Boston, died February 21. He was in his eighty-eighth year.

Born in Charlestown, he attended Boston schools and received his degree from Boston University School of Medicine in 1879. Following his graduation he started a practice in Concord and remained there for about two years before joining the faculty of Boston University School of Medicine, where he served as registrar before being appointed dean in 1900. He had also served as professor of medicine at his alma mater.

Dr. Sutherland was a member of the Massachusetts Medical Society and the American Medical Association. He had served as president of the Boston Homeopathic Society; a few years later he was elected president of the state organization and in 1904 was president of the American Institute of Homeopathy. After gaining international recognition in this field, he was chosen president of the International Council of Homeopathy. For fourteen years he was editor of the *New England Medical Gazette* and, at the time of his death, was on the editorial board of the *Journal*, having served for twenty years. He had served on the staff of the Homeopathic Hospital for nearly forty years, later becoming a trustee. He was also a member of the consulting boards of the Westboro State Hospital and the Worcester Homeopathic Hospital.

His widow survives him.

WARREN—FRANKLIN L. WARREN, M.D., of Bridgewater, died February 11. He was in his seventieth year.

Born in Shirley, he attended Lawrence Academy and Massachusetts State College, and received his degree from the University of Pennsylvania School of Medicine in 1899. Following his graduation he studied at the University of Edinburgh, Scotland.

Dr. Warren was a fellow of the Massachusetts Medical Society and the American Medical Association.

His widow, a brother and a sister survive him.

MISCELLANY

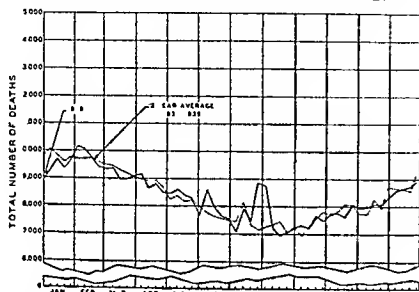
ANNUAL MORTALITY SUMMARY FOR 1940

Deaths in eighty-eight major cities during 1940 were 1.6 per cent over the 1939 figures, according to preliminary reports recently made public by Director William L.

Austin, Bureau of the Census, Department of Commerce. The number of infant deaths increased 21 per cent, compared with 1939, but the infant death rate decreased slightly.

Deaths in the eighty-eight cities totaled 436,252, compared with 429,419 reported for 1939. The weekly death totals for the first two weeks in January, 1940, were dis-

TOTAL DEATHS BY WEEKS IN 88 MAJOR CITIES



tinctly lower than the averages for the preceding three years. During the second week in June, the last week in July and the first week in August, however, they showed a significant increase over the averages for the preceding three years. This increased mortality record in July and August was closely related to the heat wave that covered a large part of the country.

The 26,261 infant deaths reported for 1940 represent an increase of 537, or 2.1 per cent, over the 25,724 reported for 1939. On the basis of estimated number of births there were, in 1940, 39 infant deaths for each 1000 births. Although this figure is provisional, it indicates a slight decrease in infant mortality when compared with the provisional rate of 41 for 1939.

In the comparison of infant rates for different cities, certain considerations must not be overlooked. The effect of differences in sex, age and racial composition of different cities must be evaluated before valid comparisons can be made.

LOAN COLLECTIONS FOR TALKS BEFORE LAYMEN

The Bureau of Health Education of the American Medical Association offers to local physicians the loan of prepared material for speakers addressing lay audiences. Even though a physician may be an able speaker, he frequently hesitates to accept invitations to speak before lay audiences because time is required to prepare material in suitable language.

It is here that the clipping-collection loan service is of value. These collections consist of material that has appeared in *Hygeia*. They are patterned after the American Medical Association's Package Library. The advantage of this material is that it is written in nontechnical language that the layman can understand. Thus, the physician is saved the effort of translating technical material into language easily understood by nonmedical groups.

Collections on eighty-two topics are available accompanying most collections is a speaker's outline. This outline is not intended as a fixed pattern that the speaker must follow but is merely offered as one way in which the material may be presented. As the physician reads the clippings he may make his own notes on the outline

and use only that portion of the material appropriate to his community.

The collections may be borrowed for a ten-day period, and the only charge to the physician is the return postage for the bound material. Collections should be ordered at least two weeks in advance, and first, second and third choices should be indicated, since the collections are not always available.

The demand for this material has grown tremendously in the last several years. Several state medical societies, as well as a few county medical societies, have found it to their advantage to develop speakers bureau library services of their own. In spite of the great demand for this material and the amount of publicity it has received, there are still a number of physicians who are ignorant of its existence. The practicing physician is not always a polished platform orator and welcomes aid of this type.

The following loan collections are available:

Anesthesia	330 I
Anemia	92 I
Appendicitis and Lavatives	177 0
Athletics and Exercise	318 I
Blood Transfusions	131 0
Cancer	61 0
Child, Health of the Preschool	401 2
Child, Health of the School	401 I
Child's Health and His Future Career	291 0
Colds	151 4
Constipation and Cathartics	184 I
Communicable Diseases	47 I
Crippled Children	225 0
Deafness	121 I
Diabetes	74 I
Diet, Watch Your	302 4
Diseases, Nine Most Deadly	292 0
Doctors—City and Country	322 I
Eyes, Adults	120 I
Eyes, Children's	120 2
Family Medicine Chest	327 I
Feeding of Children	302 6
First Aid	349 0
Food, Drug and Cosmetic Racketeers	328 0
Food, Protection of	302 7
Gall bladder Disease	180 I
Gout and Other Glandular Diseases	81 I
Growing Old Gracefully	261 I
Hair and Nails	236 0
Hay Fever—Allergy—Idiosyncrasy	305 I
Health Examinations	319 I
Health Examinations of Children	319 2
Healthy Living Ten Points in	402 0
Heart Disease	150 I
Heredity and Eugenics	312 0
Hospitals	342 0
Industrial Health	348 I
Infant Hygiene	251 0
Infantile Paralysis	16 0
Kidneys	194 I
Leprosy	33 I
Maternal Hygiene	211 0
Mates or Mismates (Marriage)	426 0
Medical Advances, Outstanding	338 I
Medical Preparedness	347 0
Menstruation and the Menopause	208 0
Mental Hygiene, Adult	122 I
Mental Hygiene, Child	124 2
Milk	337 I
Narcotics	105 0
Nursing	343 0

Obesity	73.1
Physical Education	318.3
Physical Therapy—X-Ray—Radium	335.0
Pioneers of Medicine	338.2
Play, Leisure and Recreation	320.1
Pneumonia	154.1
Posture	228.1
Progress in Preventive Medicine	338.0
Public Health	332.0
Ringworm	233.1
Rheumatism	72.1
Safety	288.0
Sex Education	422.0
Skin	238.0
Superstitions	333.1
Surgery	310.0
Syphilis and Gonorrhea	34.1
Training for Athletics and Health	318.2
Teeth	172.2
Teeth, Children's	172.3
Tobacco and Alcohol	101.4
Tonsils and Adenoids	171.0
Tuberculosis	23.1
Tuberculosis in Childhood	23.2
Vacations	320.2
Ventilation	316.1
Youth	124.3

The Wm. S. Merrell Company
Ascorbic Acid Tablets—Merrell, 25 mg
Ampul Solution Procaine Hydrochloride 1 per cent, 1 cc.
Ampul Solution Procaine Hydrochloride 1 per cent, 10 cc.
Ampul Solution Procaine Hydrochloride 2 per cent, 1 cc.
Ampul Solution Procaine Hydrochloride 2 per cent, 10 cc.
National Drug Company
Tablets Ascorbic Acid, 25 mg.
Sharp & Dohme, Inc.
Sulfapyridine
Tablets Sulfapyridine, 0.5 gm. (7.7 gr.)
"Lyovac" Tetanus Antitoxin (Bovine)
Allergenic Extracts—Mulford (for treatment) and seed, allspice, anchovy, butterfish, cashew, nut, castor bean, catfish, chicory, currant caraway seed, date, gelatin (cattle), hazel nut, hops, horse-radish, lime, mace, pike, pimento, poppy seed, porgy, quince, sage, sardine, tapioca, thyme, weakfish, white fish, feathers mixed (chicken, duck and goose), pigeon feathers, rat hair, turkey feathers.

CORRESPONDENCE

ARTICLES ACCEPTED BY THE COUNCIL ON PHARMACY AND CHEMISTRY, AMERICAN MEDICAL ASSOCIATION

To the Editor: In addition to the articles enumerated in our recent letter the following have been accepted:

Abbott Laboratories

Capsules Quinidine Sulfate, 0.2 gm. (3 gr.)
Sodium Citrate 3 per cent W/V Solution—Abbott

Drug Products Company, Inc.

Ampuls (Hyposols) Caffeine with Sodium Benzoate, N.F., 7½ gr., 2 cc.
Ampuls (Hyposols) of Camphor in Oil, N.F., 0.195 gm. (3 gr.), 1 cc.

Endo Products, Inc.

Tablets Aminophylline, 0.1 gm. (1½ gr.)
Ampule Solution Aminophylline, 0.48 gm., 2 cc.
Ampule Solution Aminophylline, 0.24 gm., 10 cc.
Ampoules of Physiological Solution of Sodium Chloride, 10 cc.
Ampoules of Physiological Solution of Sodium Chloride, 20 cc.
Ampoules of Physiological Solution of Sodium Chloride, 50 cc.
Ampoules Solution Sodium Morrhuate 5 per cent with Benzyl Alcohol 2 per cent, 2 cc.
Ampoules Solution Sodium Morrhuate 2 per cent with Benzyl Alcohol 2 per cent, 5 cc.
Solution Sodium Morrhuate 5 per cent with Benzyl Alcohol 2 per cent, 25-cc. bottles

Lakeside Laboratories, Inc.

Ampoules Phenobarbital Sodium, 0.13 gm. (2 gr.)

Mallinckrodt Chemical Works, Inc.

Quinidine Sulfate, U.S.P.

The Smith-Dorsey Company

Tablets Magnesium Trisilicate, 0.324 gm. (5 gr.)

The Upjohn Company

Tablets Ascorbic Acid, 15 mg.
Tablets Ascorbic Acid, 25 mg.
Tablets Ascorbic Acid, 50 mg.
Tablets Ascorbic Acid, 100 mg.
Tablets Nicotinic Acid, 20 mg.
Tablets Nicotinic Acid, 50 mg.
Tablets Nicotinic Acid, 100 mg.

Werner Drug and Chemical Company

Eucatropine Hydrochloride

The following products have been accepted for inclusion in the list of articles and brands accepted by the Council but not described in N.N.R. (*New and Nonofficial Remedies*, 1940, p. 560):

Endo Products, Inc.

Ampoules Magnesium Sulfate 10 per cent, 5 cc.
Ampoules Magnesium Sulfate 10 per cent, 20 cc.

Sharp and Dohme, Inc.

Allergenic Extracts for Diagnosis—Mulford

PAUL NICHOLAS LEECH, *Secretary*

535 North Dearborn Street,
Chicago, Illinois.

REPORT OF MEETING

GREATER BOSTON MEDICAL SOCIETY

A regular meeting of the Greater Boston Medical Society was held at the Beth Israel Hospital on December 3, 1940, with Dr. Aaron Thurman presiding. The speaker of the evening was Dr. Abraham Levinson, of the Northwestern University Medical School, Chicago. His

subject was 'Acute Infections of the Central Nervous System'

Dr Levinson enumerated the common causes of neurologic findings in children as follows: the onset of acute infectious diseases, meningitis, encephalitis and poliomyelitis; brain abscess, tumor, trauma, tetany, uremia and lead encephalopathy, tetanus and rabies, epilepsy, and poisonings. He gave several reasons for the difficulties encountered in the differential diagnosis of neurologic conditions in infants and children. The classic signs of meningitis may or may not be present in meningitides of the newborn and infants. Often the only manifestations are fever, bulging fontanelles and a cephalic cry. Nuclear icterus and cerebral hemorrhage are hard to differentiate from meningitis of the newborn. Lead encephalopathy should be considered in differential diagnosis. Another difficulty is the presence of unilateral symptoms in meningitis. These are due either to localized meningitis or to the presence of encephalitis in cases of meningitis. He mentioned tuberculous meningitis as a classic example of meningoencephalitis.

Dr Levinson then discussed diagnostic methods. Lumbar puncture, which formerly was employed almost invariably and too often, is now done too infrequently.

Careful study of the pellicle in the cerebrospinal fluid was urged, and the search for desquamated hexagonal cells, so-called 'Levinson cells,' was suggested. The glucose content of cerebrospinal fluid is diminished in bacterial meningitis, but is usually normal in the virus infections, such as mumps, and in syphilitic meningitis. The chlorides, although usually diminished in meningitis, he considered unimportant as a differential criterion. The Levinson test with sulfosalicylic acid and bichloride of mercury is useful in the diagnosis of tuberculous meningitis, but is not infallible. Cisternal fluid varies from lumbar fluid in cellular and sugar content, and should not be used for diagnosis.

The treatment of meningitis was then considered. Various forms and combinations of treatment have been advocated, and Dr Levinson reviewed his particular regimen. Initially, the patient is given sulfapyridine because it is beneficial in all types of meningitis. If there is no improvement in twenty-four to thirty-six hours, intravenous serum or antitoxin is administered in meningococcal meningitis. In general, combination therapy is employed, with the emphasis on chemotherapy. Sulfanilamide is used for the streptococcal form and sulfapyridine for the pneumococcal, with rabbit serum in the latter if the drug fails. Influenzal meningitis is treated with sulfapyridine. Fothergill's serum with complement has given promising results. The staphylococcal form has been attacked with sulfathiazole, sulfapyridine and serum, all in large doses. The dosage of sulfonamide preparations employed has been 4 gr per pound of body weight in the first twenty-four hours, half this amount being given immediately. The blood and cerebrospinal fluid drug levels are checked. Treatment is not stopped until the disease is well arrested, unless the toxic symptoms, such as anemia and hematuria, are marked. Tuberculous meningitis has recently been treated with calcium and vitamin D, the results have been questionable.

In mumps meningitis the symptoms are usually not marked, recovery is the rule, the cerebrospinal fluid sugar is normal and parotitis may not be present. Acute lymphocytic meningitis may at first simulate the tuberculous form, even so far as abdominal pain is concerned. It occurs mainly in the summer, and recovery is invariably complete and rapid.

Hemorrhagic encephalitis may run a rapidly fatal course. The cerebrospinal fluid is usually clear, the sugar

normal, and the globulin negative. In acute anterior poliomyelitis, the cerebrospinal fluid changes vary in the different stages of the disease. In the early systemic stage the fluid is usually normal. In the paralytic stage, there is usually an increase of amount, pressure, protein and cells. The early paralytic stage reveals essentially the same findings as the paralytic stage, but later the fluid returns to normal.

The speaker discussed tetanus, stressing the absence of fever unless there is secondary infection. For immediate prophylaxis he suggested the use of at least 3000 units of antitoxin for active immunization, two injections of toxoid. Therapeutically, he advised 40,000 to 60,000 units of antitoxin intravenously or intramuscularly or by both channels. Only one massive dose should be given. Since antitoxin merely prevents further involvement, sedation and constant nursing are especially important to counteract the symptoms. The use of Averin by rectum in doses of 25 to 80 mg per kilogram of body weight was suggested.

In regard to the drug treatment of convulsions, Dr Levinson reviewed the many available sedatives. He stated that chloroform is the best method of relief, and next to that some of the barbiturates intravenously. Magnesium sulfate was advised only in hypertensive encephalopathy. Hypertonic glucose has many drawbacks. Morphine is contraindicated because it increases intracranial pressure and thus masks the signs and symptoms.

The discussion was opened by Dr Edwin H. Place, of the Boston City Hospital, who observed that the spinal fluid changes of preparalytic poliomyelitis may simulate those of lymphocytic meningitis, but that this is of little significance if paralysis does not develop. Acute poliomyelitis affecting the proximal muscles of the four extremities may have the same type of fluid with greatly elevated protein. On the basis of the improvement shown in the treatment of meningococcal meningitis since the advent of chemotherapy, the mortality between the ages of five and forty-five years should be less than 10 per cent if early sulfanilamide therapy is carried out.

Dr Maxwell Finland, of the Boston City Hospital, discussed pneumococcal meningitis. He stated that although sulfapyridine is at present the most important single therapeutic agent, antiserum plays a large role in many cases that would not otherwise recover. Despite the fact that there is a real question whether any form of drug introduced intrathecally acts as more than an irritant, the almost miraculous recoveries with intrathecal serum in addition to complement, after all other forms of therapy have failed, still keep the question open. Sulfathiazole penetrates slowly, especially into the cerebrospinal fluid, whereas sulfanilamide is better in this regard. In general, one is apt to encounter toxic symptoms in attempting to attain high enough levels in the spinal fluid.

Dr Wilfred Bloomberg, of the Boston City Hospital, reiterated the importance of not introducing irritating substances promiscuously into the spinal canal. He stated that chloride of very low values may be found in tuberculous, even in the absence of many cells, whereas the lowest values have been observed in cases of meningismus with elevated pressure and no increase in cells. A low sugar content in some verified cases of virus meningitis has been demonstrated in contrast to the usual findings. Dr Bloomberg suggested therapeutic lumbar punctures for the lowering of pressure rather than the intravenous injection of hypertonic solutions.

The discussion was closed by Dr Levinson, who stated

that the foci of infection should be removed in all infections of the central nervous system. He agreed that intrathecal chemicals are irritating and result in a sterile meningitis. Sterilization of the blood stream should be the aim of therapy. High levels of drugs are not always necessary to effect a cure, since the permeability of the meninges is increased in meningitis. In answer to Dr. Bloomberg, it was stated that changes of chloride merely mirror some physiologic changes in the blood. And since there are so many cases with low chloride values, they cannot be considered diagnostic of tuberculous meningitis. Finally Dr. Levinson remarked that caffeine is beneficial in lowering intracranial pressure and may be used to advantage after such procedures as encephalography.

NOTICES

MEDICAL AND SURGICAL SUPPLY COMMITTEE

It will help England greatly in the care of victims of bombing raids and help England prepare for the coming invasion, if physicians in this country will give discarded or superfluous surgical instruments or surgical dressings.

Any such material should be sent to the Medical and Surgical Supply Committee, 420 Lexington Avenue, New York City.

PETER BENT BRIGHAM HOSPITAL

Dr. I. S. Ravdin, Harrison Professor of Surgery at the University of Pennsylvania School of Medicine, will serve as surgeon-in-chief *pro tempore* at the Peter Bent Brigham Hospital from March 10 to 15.

JOSEPH H. PRATT DIAGNOSTIC HOSPITAL

Bennet Street, Boston
Lecture Hall, 9-10 a.m.

MEDICAL CONFERENCE PROGRAM, MARCH

- Tuesday, March 4—Optimistic Outlook in the Treatment of Leukemias. Dr. W. P. Murphy.
Wednesday, March 5—Hospital case presentation. Dr. S. J. Thannhauser.
Thursday, March 6—X-ray Studies of Less Common Gastrointestinal Lesions. Dr. R. Schatzki.
Friday, March 7—Allergy: A problem in immunology. Asthma: A problem in physiology. Dr. F. M. Rackemann.
Saturday, March 8—Hospital case presentation. Dr. S. J. Thannhauser.
Tuesday, March 11—Psychiatric Examination of Recruits. Dr. A. W. Stearns.
Wednesday, March 12—Hospital case presentation. Dr. S. J. Thannhauser.
Thursday, March 13—The Enzymatic Breakdown of Carbohydrates. Dr. G. Schmidt.
Friday, March 14—The Neurologic Complications of Some of the Common Contagious Diseases. Dr. R. C. Eley.
Saturday, March 15—Hospital case presentation. Dr. S. J. Thannhauser.
Tuesday, March 18—Syphilis and the Spinal Fluid. Dr. W. A. Hinton.
Wednesday, March 19—Hospital case presentation. Dr. S. J. Thannhauser.

- Thursday, March 20—Tobacco and Peripheral Vascular Disease. Dr. J. S. Sprague.
Friday, March 21—Arthritis clinic. Dr. W. Bauer.
Saturday, March 22—Hospital case presentation. Dr. S. J. Thannhauser.
Tuesday, March 25—Handwriting in Neurology: Psychiatry. Dr. J. C. G. Loring.
Wednesday, March 26—Hospital case presentation. Dr. S. J. Thannhauser.
Thursday, March 27—Syringomyelia. Dr. H. H. Merritt.
Friday, March 28—Some of the Medical Aspects of Care of Patients with Rheumatic Fever and Rheumatic Heart Disease. Dr. T. D. Jones.
Saturday, March 29—Hospital case presentation. Dr. S. J. Thannhauser.

HARVARD MEDICAL SOCIETY

There will be a meeting of the Harvard Medical Society on Tuesday, March 11, in the amphitheater of the Peter Bent Brigham Hospital at 8:15 p.m. Dr. Ellis C. Cutler will preside.

PROGRAM

Presentation of cases.

Some Aspects of the Physiology of the Liver and Biliary Passages. Dr. I. S. Ravdin, Harrison Professor of Surgery, University of Pennsylvania School of Medicine.

NEW ENGLAND HOSPITAL FOR WOMEN AND CHILDREN

The monthly clinical conference and staff meeting of the New England Hospital for Women and Children will be held on Thursday, March 6, at 7:15 p.m. in the classroom of the nurses' residence. Dr. Grace E. Rochford will preside.

PROGRAM

Three case reports of diverticulitis. Dr. Grace E. Rochford. Discussion by Drs. Katherine S. Andrews and Ann P. Manton.

NEW ENGLAND SOCIETY OF ANESTHESIOLOGY

The March meeting of the New England Society of Anesthesiology will be held in the White Auditorium, Massachusetts General Hospital, on Tuesday, March 11, at 8 p.m.

PROGRAM

Ten Years' Experience with Avertin. Drs. G. A. Leonard and R. F. Sheldon.

NEW ENGLAND HEALTH INSTITUTE

The New England Health Institute, in collaboration with the health departments of the New England states, the United States Public Health Service, the United States Department of Labor Children's Bureau, the New England Tuberculosis Association, the Massachusetts Public Health Association and the Massachusetts Central Health Council, will hold its eleventh session at the Hotel Statler, Boston, on April 2-4. Those desiring detailed information should apply to the Massachusetts Department of Public Health, State House, Boston.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING
SUNDAY, MARCH 2

SUNDAY MARCH 2

- 14 p.m. The Transfusion of Blood and Blood Banks Dr Carl W. Walter Free public lecture Harvard Medical School Building D
14 p.m. The Control of Tuberculosis Dr Henry D. Chaffin On the Firing Line (a motion picture) Cambridge Hospital, Margaret Jewett Hall

MONDAY MARCH 3

- 12-15-1:15 p.m. Clinicopathological conference Peter Bent Brigham Hospital amphitheater

TUESDAY MARCH 4

- 9-10 a.m. Optimistic Outlook in the Treatment of Leukemias Dr W. P. Murphy Joseph H. Pratt Diagnostic Hospital
11-13 a.m. Some Recent Advances in Surgery Dr Herbert Finn John T. Bottomley Society Out Patient Building of the Carney Hospital
12-15-1:15 p.m. Clinicoradiological conference Peter Bent Brigham Hospital amphitheater
5-6 p.m. Factors That May Induce Cardiac Infarction Dr Ernst P. Boas Greater Boston Medical Society Auditorium Beth Israel Hospital

WEDNESDAY MARCH 5

- 9-10 a.m. Hospital case presentation Dr S. J. Thannhauser Joseph H. Pratt Diagnostic Hospital
12 m. Clinicopathological conference Children's Hospital
2-4 p.m. Jaundice Drs Soma Weiss and E. C. Cutler Peter Bent Brigham Hospital

THURSDAY MARCH 6

- 8-10 a.m. Combined clinic of the medical surgical oral and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital at the Children's Hospital
9-10 a.m. X-ray Studies of Less Common Gastrointestinal Lesions Dr R. Schatzki Joseph H. Pratt Diagnostic Hospital
7-15 p.m. Three case reports of diverticulitis Dr Grace F. Peckford New England Hospital for Women and Children

FRIDAY MARCH 7

- 9-10 a.m. Allergy A problem in immunology Asthma A problem in physiology Dr F. M. Rckemann Joseph H. Pratt Diagnostic Hospital

SATURDAY MARCH 8

- 9-10 a.m. Hospital case presentation Dr S. J. Thannhauser Joseph H. Pratt Diagnostic Hospital

- *Open to the medical profession
*Open to the public

MARCH 4-29—Joseph H. Pratt Diagnostic Hospital Page 398

MARCH 8—American Board of Ophthalmology Page 201 issue of August 1

MARCH 11—Harvard Medical Society Page 398

MARCH 11—New England Society of Anesthesiology Page 398

MARCH 12-14—New England Hospital Assembly Hotel Statler Boston

MARCH 13—Pennsylvania Association of Physicians Page 273 issue of August 15

MARCH 19—New England Otolaryngological Society Page 349 issue of February 20

MARCH 21-23—New York University College of Medicine All mini Day Page 135 issue of January 16

MARCH 25—Tufts College Medical School All mini Association Page 348 issue of February 20

MARCH 31-APRIL 4—54th Annual Postgraduate Institute of the Philadelphia County Medical Society Page 394 issue of February 20

APRIL 7-4—New England Health Institute Page 398

APRIL 21-25—American College of Physicians Page 105 issue of June 20

APRIL 28-30—American Academy of Physic Medical Science session Hotel Pennsylvania New York City

MAY 21-22—Massachusetts Medical Society Boston

MAY 28-JUNE 2—American Board of Obstetrics and Gynecology Page 202 issue of February 6

JUNE 2-6—American Medical Association Cleveland Ohio

OCTOBER 14-17—American Public Health Association Page 135 issue of January 16

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

MARCH 5—X-ray in Heart Disease Dr Merrill C. Seaman Essex Sanatorium Middlesex

APRIL 2—Pediatric Problems in General Practice Dr Joseph Garland Add-on Gilbert Hospital Gloucester

MAY 14—Relation of the Doctor to the Law Mr Leland Powers New Ocean House, Swampscott

FRANKLIN

MARCH 11

MAY 13

Meetings will be held at 11 a.m. at the Franklin County Hospital Greenfield

NORFOLK

MARCH 25—To be announced

MAY 8—Censors meeting Hotel Puritan

SUFFOLK

APRIL 30—Page 604 issue of October 10

MAY 1—Censors meeting Page 261 issue of February 6

WORCESTER

MARCH 12—Memorial Hospital Worcester

APRIL 9—Hahnemann Hospital Worcester

Supper at 6:30 p.m. followed by a business meeting and scientific program

BOOK REVIEWS

Diagnosis and Treatment of Head Injuries By Sidney W. Gross, M.D., and William Ehrlich, M.D. Introduction by Percival Bailey, M.D., Ph.D. 8", cloth, 275 pp., with 94 illustrations. New York: Paul B. Hoeber, Incorporated, 1940 \$5.00

The average physician is called on more and more to treat craniocerebral injuries, for which he has had no special training. This book aims to serve as a readily available consultant to those who see the occasional head injury. The perplexing problem in such cases is the great clinical similarity in the early stages of severe and mild injuries when considered from the pathological standpoint. Hence, one wishes that the authors might have spent more space discussing the diagnostic problems that arise in the fresh case, omitting some of the more detailed discussion of operative cases, which are seldom treated by the men for whom the book was supposedly written.

The authors' attitude on lumbar puncture is halfway between those who say "never" and those who say "always." Sometime these two opposing schools should come to a sound physiologic compromise. The present treatise evades the issue and does not give the complete answer.

This book will be particularly useful in the library of the small hospital, since it is a handy reference for the physician who is required to treat an occasional case of head injury.

Psychological Studies in Dementia Praecox By Isabella Kendig, Ph.D., and Winifred V. Richmond, Ph.D. 4", paper, 211 pp., with 25 graphs and 8 tables. Ann Arbor, Michigan: Edward Brothers, 1940 50 cents (distribution costs).

The title might more precisely read "Psychometric Studies," since the work deals fully and competently with the reaction of schizophrenic patients to the 1916 Stanford-Binet scale. To follow most of the work it is necessary to have considerable knowledge of this procedure, as well as acquaintance with the general principles of intelligence testing. Some 500 patients with schizophrenic reactions are specially studied, with control material from other pathologic groups as well as from comparable normal persons. Much attention is paid to the patterns of responses, the study of which demands more than ordinary effort, since the Binet scales are only partly suited thereto.

The principal conclusion is to minimize in these conditions the role of intellectual deterioration in the sense of an irreversible process. Not only are reversals to be observed, but with a little ingenuity much intellectual functioning can be elicited that is inaccessible to the conventional examining technic. Shock therapy arrived a little late for a considerable part of the work, but its confirming implications are recognized. Relevant literature is well cited; there should have been an index.

Aux confins de la dyspepsie. By Maurice Loeper. 8°, paper, 308 pp., with 33 illustrations. Paris, Masson et Cie, 1940. \$1.85.

In his introduction the author offers the thesis that only rarely is dyspepsia—or what we usually refer to as indigestion—a symptom of intrinsic gastric disease. The entire volume is an attempt to describe the large variety of clinical conditions, other than those concerning the stomach directly, in which indigestion may play some part. Practically all systems are covered with lengthy clinical discussions and with some attempt to explain why the symptom originates. Little new material is offered, either in the way of facts or of original observations. The author has succeeded in conveying the impression that indigestion is a practically constant concomitant of almost every disease, regardless of whether the intestinal, genitourinary, cardiorespiratory, endocrine or central nervous system is primarily involved. The theme running through the entire volume is that the patient with indigestion should be thoroughly investigated for the underlying cause of his illness and not considered merely from the point of view of that symptom; furthermore, the therapy should be directed mainly at the underlying cause.

An Atlas of the Commoner Skin Diseases. Second edition. By Henry C. G. Semon, D.M. (Oxon.), F.R.C.P. (London). 4°, cloth, 273 pp., with 120 colored plates. Color photography under the direction of Arnold Moritz, M.B., B.C. (Cantab.). Baltimore: Williams and Wilkins Company, 1940. \$12.00.

The first impression that one receives on thumbing over the pages of this atlas is that it is alive. It is a welcome escape from the museum-type of colored atlases of photographs of the moulages of the past. To study the natural-colored photographs of these lesions is the next best thing to attending the clinic itself. This is by far the best collection of colored plates of common dermatoses that the reviewer has seen. The selection of the dermatoses that are illustrated is excellent, and the descriptions quite succinct.

One can, however, find some controversial elements in numerous minor details, particularly in the discussion of therapy. Although the photographic technic on the whole is excellent, the quality of the illustrations is variable. This is perhaps reasonable, but the plates that can be criticized are those in which the depth of the field is too short—a flaw that could have been remedied by using a smaller stop with more illumination. Because the photography was under the direction, not of the medical author, but of an expert, it is reasonable to expect technical results higher than the average. The reviewer cannot resist the temptation to state that there is probably a greater degree of technical ability in color-plate reproduction in the American press, particularly in the field of magazine illustration, than that shown by these illustrations. For those who require a relatively accurate representation of the common dermatoses, this volume can be highly recommended.

The Public Health Nurse and Her Patient. By Ruth Gilbert. 8°, cloth, 396 pp. New York: The Commonwealth Fund, 1940. \$2.25.

This thoughtfully written book commands the attention of the physician as well as that of the public-health nurse for whom it was written. Begun as a sort of handbook of the principles and the application of mental hygiene in nursing practice, it developed into a general discussion of the whole subject of the human relation between the nurse and her patient. The author, who is supervisor of social work in an organization devoted to community psychiatric service, writes of mental hygiene in public health nursing, of caring for the sick patient, of teaching health, of the nurse and the maternity patient, of the child and his family, and of the nurse's relation to her co-workers. The field is very broad.

The result is a kind of dignified and specialized "How to Win Friends and Influence People." Such advice is not only hard to give; it is even more difficult to follow. Nurses, as well as physicians, who are outstandingly successful in their human associations, are born, not made. Even though such a book as this cannot be expected to make good public-health nurses of poor ones, its effect will be excellent if it serves merely to attract to the field those who are qualified by temperament to serve in it.

The New International Clinics: Original contributions, clinics and evaluated reviews of current advances in the medical arts. Edited by George Morris Piersol, M.D. Vol. III, New Series Three. 8°, cloth, 358 pp., with 87 figures, 17 tables, and 14 charts. Philadelphia: J. B. Lippincott Company, 1940. \$3.00.

This book contains a variety of original contributions and clinics that maintain the high standard to which we have become accustomed.

Among the original contributions are the following: "Emotional Factors in Coronary Disease and Angina Pectoris," "The Pathology of Urogenital Tuberculosis," "Present Concepts of Erythrocyte Sedimentation Rate," "The Significance of Rectal Pain," "Congenital and Acquired Sex Changes" and "Mikulicz' Disease."

The clinic presentations include Heuer's paper on the treatment of gallstone disease, emphasizing the advantages of early diagnosis and treatment. Papers concerning the electrocardiographic changes in pulmonary infarction, the treatment of bleeding peptic ulcer, the use of sulfanilamide in obstetrics, the treatment of cryptorchidism and numerous brief articles on other timely subjects are also to be found in this volume.

An excellent review of ten years' progress in obstetric analgesia from the Department of Obstetrics of Johns Hopkins University makes this an altogether worthwhile addition to the previous editions.

The Practice of Medicine. By Jonathan Campbell Meakins, M.D., LL.D. Third edition. 4°, cloth, 1430 pp., with 562 illustrations, including 48 in color. St. Louis: C. V. Mosby Company, 1940. \$10.00.

This work has now become an established medical text and is widely recognized as one of the leading books in its field. The author has made a few changes in the third edition, but the book is essentially the same as it was when first published in 1936. The outstanding feature of numerous illustrations, as compared with the amount of text, has been maintained. Unfortunately, the publisher has also retained the green-tinted paper of poor quality. The book, however, is still to be highly recommended.

The New England Journal of Medicine

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VOLUME 224

MARCH 6, 1941

NUMBER 10

THE MANAGEMENT OF THE COMPLICATIONS OF PEPTIC ULCER*

T. GRIER MILLER, M.D.†

PHILADELPHIA

THE important complications of peptic ulcer are perforation, hemorrhage, cicatricial stenosis and, in gastric ulcer, malignant degeneration. Their management, in a broad sense, involves not only procedures designed to restore their victims to good health but also measures to prevent their development. This necessitates, in the first place, a brief consideration of the treatment of simple uncomplicated peptic ulcer.

Although perforation or hemorrhage occasionally represents the first manifestation of peptic ulcer, it is exceedingly uncommon for either of them to develop in a person on an adequate ulcer program; this is not necessarily true for obstruction or malignant degeneration, but at least good ulcer therapy constitutes the only available means of avoiding any of the complications.

What, then, is a proper peptic-ulcer regimen? To be rational it must be based on an appreciation of the fundamental etiology of ulcer. That, unfortunately, is not known, though little by little physicians have acquired knowledge of some of the predisposing or associated factors, which, however, are difficult to evaluate.

Thus it has been known for a long time that an acid gastric secretion is essential to ulcer formation; that ulcers, at least superficial ones of the stomach, often develop in the presence of severe debilitating disease, such as an acute general infection; and that gastritis and local vascular lesions are frequently associated. At the same time it is appreciated that an acid gastric secretion is normal and that the degree of acidity may be as high in a normal person as in one with an ulcer; that the gastric ulcers of debilitating diseases are usually recent and superficial, by no means similar to the chronic ulcers commonly seen in practice; and that gastritis and local vascular lesions may be secondary as well as primary developments.

Today, attention is focused more largely on the person who has the ulcer than on his stomach or duodenum: on his heredity, his physical, mental and emotional make-up, the nature of his endocrine and autonomic nervous system equipment, his social status and his personal habits of life. The thin, lantern-jawed, hungry-looking person with a nervous, introspective and sensitive temperament is the one likeliest to develop peptic ulcer. Draper, Dunn and Seegal¹ say that such a person has little endurance, but is quickly rehabilitated by food, short periods of rest and sleep. Sometimes he shows imbalance of the sympathetic and parasympathetic nervous systems or some endocrine disturbance. These patients, it is found, frequently develop ulcer when subjected to unusual emotional strain, to continued worry and anxiety, to fatigue, to loss of sleep, to improper food or to the excessive use of tobacco or alcohol.

On such a theory as to etiology, the therapy of simple peptic ulcer is largely based today. One still attempts to keep the gastric acidity under control, but not necessarily neutralized. This is accomplished by frequent feedings rather than by alkalis. Nothing can be done about hereditary or constitutional factors, but much emphasis is placed on keeping the patient at ease, avoiding physical and nervous strains, rearranging the social environment, and providing for good nutrition, the careful mastication of food and the avoidance of foods and drinks that are mechanically or chemically irritating. The situation is much the same as in active pulmonary tuberculosis. The patient has a chronic disease, and he must reorganize his whole life for the future, even for the periods when he has no active lesion, since recurrences and complications are common. Local measures are often of great importance in both diseases, but it is equally important for the ulcer patient as well as the tuberculous patient to develop a philosophical attitude, to conquer his natural tendency to fret and worry and to avoid excessive responsibilities

*Presented at the meeting of the New England Postgraduate Assembly, Cambridge, Massachusetts, November 14, 1940.

From the Gastrointestinal Section (Kinney-Thomas Foundation) of the Medical Clinic, University of Pennsylvania Hospital.

†Professor of clinical medicine, University of Pennsylvania School of Medicine.

and undue nervous and physical strain. He must at the same time appreciate the necessity of a change in his habits of eating, give up alcohol and tobacco, if addicted, and acquire a fixed and leisurely routine of life.

Such a program is not easy. It is far more difficult than merely securing a few weeks' rest in bed, giving a series of hypodermic injections, extracting teeth, removing tonsils or administering alkalis along with milk and cream.

These things apply primarily to the management of simple ulcer cases and constitute the essentials for the prevention of the complications of peptic ulcer. They apply equally to the treatment of the complications, but are overshadowed by the indications for more radical therapy.

Of the complications, perforation is the most dramatic, and its therapy is entirely surgical. The internist's sole duties in a case of acute perforation are promptly to make the diagnosis and to secure a competent surgeon. In the subacute case the diagnosis may be difficult and may require much time and study, but the therapeutic indications are surgical and need not receive further consideration here.

Pyloric obstruction, on the other hand, is not always an indication for surgery. It may be due to spasm, an acute inflammatory swelling about the ulcer, edema incident to a low blood-plasma protein or to cicatricial contraction. Only when the lesion is proved to be permanent is surgery indicated. Before that decision is made the patient deserves a period of bed rest for the first few days, with constant suction on the stomach contents to keep the organ empty, and fluids, including, if necessary, whole blood or blood plasma, by vein. Such intravenous injections are especially indicated if the plasma protein of the blood is low. Liquid and soft foods, including some protein, should be given by mouth as soon as possible. In some cases it may be possible to intubate the small bowel and feed into the duodenum or jejunum. Hot applications, preferably moist, are often helpful in relaxing spasm, and sometimes belladonna is effective. Only when, after such a period, the obstruction persists, as shown by continued symptoms or roentgenologic study, should surgery be employed. In such cases of persistent organic obstruction of the pylorus, surgery is clearly indicated, and a gastroenterostomy is usually sufficient to bring about permanent relief.

Hemorrhage is the third and commonest complication of peptic ulcer. Its incidence is not known. In the literature one finds statements to indicate that it occurs in 20 to 40 per cent of cases, but these are based largely on hospitalized cases, which

include only the severest and most of those with extensive hemorrhage. On the other hand, many ambulatory patients have small hemorrhages that give rise to no symptoms, so that their feces are rarely examined.

Severe hemorrhage, in any event, does not often develop in the patient who is on a proper ulcer regimen. I do not believe that I have observed a hemorrhage of significant severity in a case under adequate treatment, except when the patient has been subjected to some unusual emotional strain or after some other digression from his routine of management. Prevention, therefore, is largely a matter of keeping the patient on his ulcer program.

When marked hemorrhage does occur, one should first of all decide whether it is primarily a medical or a surgical problem. That will depend more largely on one's training and experience than on any available data from the literature on the subject. Some surgeons believe that all such cases should be operated on within twenty-four to forty-eight hours; Finsterer² reported a mortality of only 5.9 per cent in a series of cases so handled. Other surgeons, notably Dr. Arthur W. Allen, of Boston, prefer to wait until the hemorrhage has ceased, but under certain conditions,—elderly patients who continue to bleed for two days,—Dr. Allen³ operates in the midst of the hemorrhage; his mortality is 14 per cent. In spite of early operation, some surgeons have had a high mortality, even 60 per cent (Ross⁴). Dr. Allen has had a mortality of 33 per cent in his patients past fifty years of age. We have delayed operation until it was obvious that, except by means of a radical procedure, the patient would die; we have had only 5 such cases, and the patients all died following operation. For 383 operated cases collected from the literature Elsom and I⁵ found a mortality of 28 per cent.

On the other hand, for 5843 patients treated medically, we found the mortality to be only 8.7 per cent, ranging for the different authors from 0 to 25 per cent. In most cases the medical treatment has consisted of bed rest, starvation and morphine for the period of active bleeding, followed by the Andresen or the Sippy regimen. On this program, in our series of 49 cases, there was a mortality of 6.1 per cent. If we add to these our patients operated on after the cessation of hemorrhage, there were 63 cases, with a mortality of 6.3 per cent.

Five series of cases, totaling 116, are reported in which no deaths occurred⁶⁻¹⁰; all of these were treated by prompt feeding. Meulengracht's¹¹ total series of 491 cases, all treated by prompt and

fairly adequate feeding, had a mortality of only 2 per cent, and if to this are added other cases treated by his technic (a total of over 861 cases), the mortality is only 2.3 per cent. It seems, therefore, that his procedure deserves special consideration.

Meulengracht feeds his patients from the time of their hospitalization, even while still bleeding, and gives them six feedings a day of a generous diet, including ground meats, vegetable purées, bread and butter, tea and cereals. His program is based on the observations that exhausted underfed patients often die of hemorrhage and that patients often stop bleeding in spite of feedings, and on the opinion that an empty stomach with free acid is not conducive to the healing of an ulcer.

I was not greatly impressed by Meulengracht's regimen at first, and suspected that he had included all cases with bleeding, but when I learned that a third of his cases had a hemoglobin reading of less than 50 per cent and that other clinicians using his feeding regimen were getting similar results, we cautiously began to feed our patients, even in the midst of hemorrhage. I confess that we have usually started with a somewhat simpler dietary but have rapidly included all the articles he advised. We have now had 28 cases with but 1 death—a 4 per cent mortality; the average hemoglobin reading was 41 per cent. In one case the bleeding kept up for a week, and several transfusions were necessary to maintain a safe blood level. We finally operated because of the continued bloody stools, but at operation no blood was found in the stomach or duodenum and the resected ulcer showed fresh healing. Our series is small and with a larger one we may have less favorable results, but at least I am convinced that the feeding program is as safe as starvation, and certainly the patients, instead of being in an exhausted state and poor operative risks, are cheerful, contented and in good condition for any subsequently required operative procedure.

Undoubtedly some patients will not survive any conservative program, and perhaps some of them could be saved by prompt operation, but it is impossible to pick out such cases in advance; if all are operated on, the mortality, even in Finsterer's hands, is far greater than the medical mortality on the newer program.

Let me make one other point in reference to the therapy of hemorrhage. It has been the custom to give morphine freely to the acutely bleeding cases. Morphine, however, secondarily relaxes the duodenum, which is unfavorable to the cessation of hemorrhage. Some such drug may be necessary to quiet the fears of certain patients, but I have usu-

ally found the barbiturates, orally administered, equally effective and devoid of at least a theoretical objection. This point deserves further observation.

Furthermore, I doubt the necessity of alkaline medication in bleeding ulcers and suspect that often it is a factor in the disturbed chemical condition of the patient. Our patients have seemed to do equally well without any such medication.

Finally we come to the question of malignant degeneration in gastric ulcer. Palmer¹² believes that such a change never occurs, but that ulceration develops in primarily malignant lesions and that the malignant ulcer was always malignant. Other gastroenterologists and pathologists, however, believe that a benign gastric ulcer may undergo secondary malignant change, and they therefore consider the malignant lesion a complication. The answer is uncertain, but at least some ulcers of the stomach are malignant, perhaps 5 to 10 per cent or more.

Such a lesion, whether a peptic-ulcer complication or not, is always to be managed surgically, unless, of course, it is obviously inoperable. The internist's primary duty consists in making the diagnosis, and that is far from easy. The gastroscope has been a great help, but even that procedure is by no means infallible. Roentgen study often can establish the diagnosis, but not always in the early case, and it is only in the early case that one has a chance of curing the patient. Dr. Sara Jordan,¹³ of Boston, has emphasized the significance of repeated roentgenologic studies, but even when the ulcer niche decreases with time one cannot be sure that the diminution has not resulted from filling of the crater with cancer tissue. The size of the lesion has been regarded as significant, all those larger than a fifty-cent piece being considered malignant, but everyone with experience has known far larger lesions to heal rapidly and permanently on a simple medical regimen. Dr. George W. Holmes,¹⁴ of Boston, has rendered a great service by emphasizing the importance of the location of the lesion, those about the pylorus and along the greater curvature usually being malignant and those of the mid-lesser curvature benign.

The final decision of when to operate is difficult, and one must take into consideration all the factors mentioned: size, location, roentgenologic and gastroscopic observations, response to therapy and the general state of the patient. I do not know the answer and have made mistakes both ways. One should tend always to err, if one must, on the side of safety for the patient.

Finally, among the complications, though it is

not strictly speaking a complication, is the refractory ulcer case—the type that, for some reason, does not respond to the usual sort of ulcer therapy. Such cases deserve, first of all, complete bed rest for a period of weeks, antispasmodics, sedatives, a strict dietary program and perhaps alkalies. In these alone I have found it helpful to introduce a tube into the stomach from time to time to determine definitely whether the gastric acidity is completely controlled. In such a way, some patients can be relieved of symptoms, but even they usually have a recurrence under the slightest provocation, and in most cases finally come to operation. In these a gastroenterostomy is usually of no permanent help; only a properly performed gastric resection gives a satisfactory result.

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REFERENCES

1. Draper, G., Dunn, H. L. and Seegal, D. Studies in human constitution: facial form and disease correlation. *Ann. J. M. Sc.* 169:322-328, 1928.
2. Finsterer, H. Operative treatment of severe gastric haemorrhage of ulcer origin. *Lancet* 2:303-305, 1936.
3. Allen, A. W. Acute massive hemorrhage from upper gastrointestinal tract, with special reference to peptic ulcer. *Surgery* 2:713-731, 1937.
4. Ross, K. Treatment of haemorrhage from peptic ulcers. *M. J. Australia* 1:168-170, 1930.
5. Miller, T. G. and Elsom, K. A. Management of massive hemorrhage from peptic ulcer. *M. Clin. North America* 22:1711-1733, 1938.
6. Gubergrits, M. M. Ueber die Diättherapie bei blutendem Magenschwür. *Deutsche med. Wchnschr.* 62:64, 1936.
7. Witts, L. J. Haematemesis and melaena. *Brit. M. J.* 1:847-852, 1937.
8. Lineberry, E. D. and Issos, D. N. Treatment of massive hemorrhage from duodenal or gastric ulcer. *South. M. J.* 30:1228, 1937.
9. Boyd, L. J. and Schlachman, M. Meulengracht treatment of bleeding peptic ulcer. *Rev. Gastroenterol.* 5:43-54, 1938.
10. Barnes, C. G. Developments in treatment of hemorrhage from peptic ulcer. *Clin. J.* 68:357-364, 1939.
11. Meulengracht, E. Medical treatment of peptic ulcer and its complications. *Brit. M. J.* 2:321-324, 1939.
12. Palmer, W. L. Benign and malignant gastric ulcers: their relation and clinical differentiation. *Ann. Int. Med.* 13:317-338, 1939.
13. Jordan, S. M. Medical aspect of cancer of the stomach. *J. A. M. A.* 112:618-623, 1939.
14. Holmes, G. W. and Hampton, A. O. The importance of location in the differential diagnosis of benign and malignant gastric ulcerations. *New Eng. J. Med.* 208:971-976, 1933.

PELVIC DELIVERY UNDER LOCAL INFILTRATION ANESTHESIA*

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IN 1913, Gellhorn¹ advocated the use of local and spinal anesthesia in gynecology and obstetrics. In 1916 King² described a technic of perineal anesthesia in labor. Although Gellhorn,³ Rose,⁴ Torland,⁵ Greenhill,⁶ O'Connor,⁷ Walker,⁸ and Urnes and Timmerman⁹ advocate local anesthesia for pelvic delivery, the method has never become popular in this country. In 1938 Bushnell¹⁰ sent questionnaires to ninety-six outstanding obstetricians scattered throughout the United States. An analysis of seventy-three completed questionnaires revealed that local anesthesia was used in only seven institutions.

Greenhill¹¹ and Adam¹² describe the many advantages of local anesthesia. When properly used the method has been proved to be efficacious.^{4, 8, 9} Because of the simplicity and obvious safety of local-infiltration anesthesia in obstetrics, it is hard to understand why the technic has not been more generally adopted. By and large, doctors are reluctant to use local anesthesia for pelvic delivery for the following reasons: the value of complete amnesia during labor is overemphasized; lack of understanding in the preparation of novocain (procaine hydrochloride) solutions is a common deterrent; local anesthesia requires more constant surveillance of the patient in labor than is necessary for some of the methods of analgesia and anes-

thesia now in vogue; it cannot be successful unless the operator is familiar with the anatomy of the female perineum and external genitalia.

ANATOMY

The nerve distribution in the female perineum and external genitalia is shown in Figure 1. The pudic nerve leaves the pelvis through the great sacrosclatic foramen, passes along the outer aspect of the spine of the ischium, accompanies the pudic vessels upward and forward along the outer wall of the ischio-rectal fossa in a sheath of the obturator fascia called Alcock's canal, and divides into the perineal nerve and the dorsal nerve of the clitoris. The inferior hemorrhoidal nerve branches off the pudic trunk before its terminal division. These nerves pass through the ischio-rectal fossa and supply the skin of the perineum, the labia minora, the greater part of the vagina, a part of the labia majora and parts of the anus.

The small sciatic nerve also emerges from the pelvis through the great sacrosclatic foramen and supplies the skin of the perineum and of the back part of the thigh and leg. It gives off the inferior pudendal nerve, which curves forward below the tuberosity of the ischium, pierces the fascia lata, and proceeds forward beneath the superficial perineal fascia to supply the skin of the labia, communicating with the superficial perineal and inferior hemorrhoidal branches of the pudic nerve.

The ilioinguinal nerve issues from the external

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abdominal ring and supplies the skin of the upper and inner part of the thigh and the skin of the labia.

The pelvic branches of the second, third and fourth sacral trunks run forward on either side of the rectum, unite with the sympathetic ganglion that lies between the rectum and the cervix, and supply the bladder, the uterus, the upper part of the rectum and the lower part of the pelvic peritoneum.

The technic of infiltration anesthesia outlined in this paper blocks the branches of the pudic nerve,

ing for three to five minutes or by autoclaving for five minutes at five pounds' pressure. Whenever possible the solution should be made with sterile physiologic saline solution. Uniformly good results are obtained with a 1 per cent solution.

For home delivery, the solution may be prepared in the following manner: A 250 cc. Pyrex Erlenmeyer flask is immersed in boiling water for ten minutes. To the sterile flask is added about 100 cc of sterile normal saline solution or ordinary boiled tap water and ten novocain "A" tablets (Winthrop). The mouth of the flask is covered

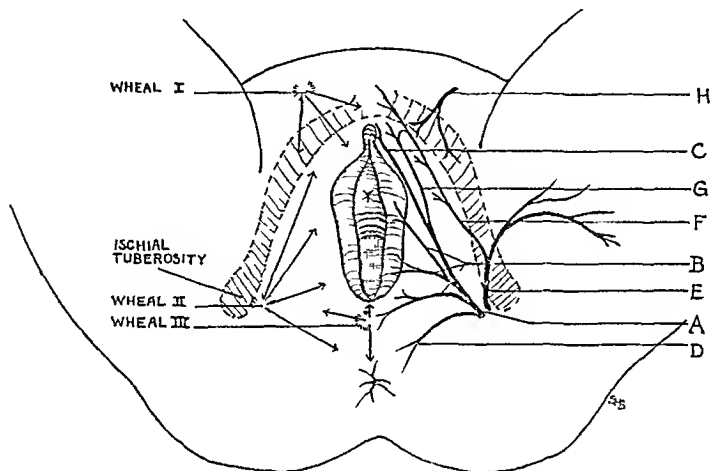


FIGURE 1 Diagrammatic Representation of Blockage of the Nerve Supply of the Perineum and External Genitalia through Local Infiltration Anesthesia

A = pudic nerve, B = perineal and labial branches of the pudic nerve, C = dorsalis clitoridis nerve, D = inferior hemorrhoidal nerve, E = small sciatic nerve, F = inferior pudendal branch of the small sciatic nerve, G = superficial perineal nerve, H = ilioinguinal nerve

the inferior hemorrhoidal nerve, the perineal branches of the small sciatic nerve and the labial branch of the ilioinguinal nerve

EQUIPMENT

Novocain

A considerable part of the success of this method depends on the proper preparation of the novocain solution. Most hospitals subject novocain solutions to the sterilizing technic that is used for dry goods and other equipment. This often results in a partial decomposition of the product so that it is inferior from the anesthetic stand point and may also contain elements that have a mildly toxic effect on the tissues.¹⁴ Ideally, novocain solutions should be prepared the day they are used and should be sterilized either by boil-

ing with a sterile gauze square, held in place by a rubber band. The solution is then brought to a boil. When cool, it is ready for use.

Novocain "A" tablets contain suprarenin, which gives the solution a hemostatic effect and also prolongs its anesthetic action. If pure novocain is used, 10 minims of a 1:1000 solution of adrenalin should be added to each 100 cc of solution. Solutions containing epinephrine should not be subjected to prolonged boiling or autoclaving, because epinephrine is not heat stable. Novocain-suprarenin solutions in ampules are convenient for delivery in the home.

Syringes and Needles

Any 10-cc glass syringe will suffice for the injection of the novocain solution, but a needle-

locking syringe, such as the Luer-Lok type, is advantageous.

There should be three sizes of needles. A 1¼-inch, 24-gauge Yale hypodermic needle, is used for intracutaneous and subcutaneous injections (Fig. 1). Three-inch, 20-gauge and 5-inch, 20-gauge Luer-Lok needles are desirable for infiltration of the deeper tissues. An ordinary hypodermic needle, a Wassermann needle and a spinal-puncture needle can be used perfectly well if the needles recommended are not available. The needles should have a short bevel, so that there will be less likelihood of puncturing blood vessels.

CONDUCT OF LABOR

No standard procedure is utilized for the selection and dosage of analgesic agents used during labor. Roughly, however, the first stage of labor is divided into three phases.

Phase 1. As soon as it is established that the patient is in true labor and that the contractions are causing distress to the patient, a sedative is administered. If it seems likely, from an evaluation of the type of contractions and of the dilatation of the cervix, that labor will continue for more than four hours, ⅛ gr. morphine sulfate and 1/200 gr. scopolamine hydrobromide are given subcutaneously.

Phase 2. In the middle of labor, as the action of the morphine and scopolamine wears off and more medication is needed, Seconal or pentobarbital sodium in doses of 3 to 4½ gr. will give the necessary relief. The former acts quickly and has a shorter action and is thus quite satisfactory for the conduct of these cases.

In some patients, this and the first phase merge into one another, and the labor appears to be one that will progress rapidly. In these cases the morphine, and often the scopolamine, are omitted.

Phase 3. The latter part of the first stage of labor can be made quite bearable for the patient by administering a few breaths of nitrous oxide with each pain. The face mask is removed after the contraction passes. Gas analgesia is continued until the baby's head strikes the pelvic floor. Ether, with each contraction, is satisfactory for the conduct of home delivery. In 1916 Hoag¹⁵ proposed the combined use of scopolamine, nitrous oxide and oxygen, and local infiltration for pelvic delivery. His perineal infiltration was, however, inadequately performed.

Local anesthesia cannot be properly utilized if the patient receives analgesic and amnesic drugs during labor in amounts that produce irrationality, restlessness and inability to co-operate. Inhalation analgesia is ideal because of its transitory effect,

thereby making it possible for the patient to receive relief from pain and still retain the ability to co-operate when expulsive efforts are needed in the second stage. Inhalation analgesia is omitted when patients are comfortable without it or if the patient suffers from lung disease, such as acute upper respiratory infection, pneumonia or pulmonary tuberculosis.

It may not be feasible to produce analgesia during labor in the home. Local anesthesia is particularly desirable in these cases because it renders the actual delivery process essentially painless and affords the patient much relief that otherwise would not be available.

TECHNIC OF PERINEAL INFILTRATION

Since parasacral conduction anesthesia and pudic block¹⁶ are technically too difficult for the average doctor engaged in obstetric practice, an attempt has been made to develop a technic of local infiltration that can be simply done and will nevertheless be effective from the patient's standpoint. It is not greatly different from the method originally described by King² and later used by Torland,⁵ Walker⁸ and Urnes and Timmerman.⁹

A multiparous patient should be infiltrated as soon as the cervix is fully dilated, unless there is good reason to believe that the second stage of labor will be prolonged because of mild disproportion, unrotated posterior position or the like. A primiparous patient is infiltrated when the baby's head strikes the perineum and begins to distend the vulval tissues.

Preparation of the Patient for Delivery

The patient receives nitrous oxide and oxygen while the perineum is being prepared. This prevents the pain associated with the contact of chemical solutions with the vulvovaginal tissues. This discomfort lasts only two or three minutes, and the inhalation is therefore carried out only for a comparable length of time. Inhalation analgesia is omitted during preparation of the patient for delivery if nonirritating solutions—soap and water and 1 per cent Lysol or 1:5000 mercury bichloride—are used, which is usually the case in deliveries in the home.

Area of Infiltration

Five wheals are made at points demonstrated in Figure 1. The nerves are then blocked according to the following technic.

The labial branches of the ilioinguinal nerves are anesthetized by injecting 5 cc. of novocain solution downward toward the external abdominal ring from Wheal I and fanned out in an area above and lateral to the clitoris.

Through guidance of a finger of the gloved hand in the vagina, the pudic, inferior hemorrhoidal and inferior pudental nerves are anesthetized by inserting the 3-inch needle at Wheal II and injecting 10 cc. of novocain solution into an area medial and posterior to the ischial tuberosity. The plunger of the syringe is drawn back to determine whether the needle is in a blood vessel, because intravenous injections may cause undesirable reactions.

Infiltration of the ischiorectal fossa is best done with the five-inch needle. The area of infiltration should be fan shaped and should extend from the pubic ramus above to a line connecting the anus with the ischial tuberosity below. Infiltration medial to the descending ramus of the pubic bone blocks those branches that escape the deep injection at Wheal II. Approximately 10 cc. of solution is needed for infiltration of the ischiorectal fossa. This infiltration is always carried out with the needle in motion to avoid intravenous injections.

Through Wheal III a crescent-shaped area of infiltration of the perineum is made above and lateral to the anus. The rectovaginal septum is then infiltrated upward and laterally for a distance of 5 or 7 cm. under guidance of a finger in the vagina. Infiltration of the perineum and rectovaginal septum requires another 10 cc. of solution.

The amount of solution injected at various points is only roughly approximate, and the total varies between 50 and 70 cc.

CONDUCT OF THE DELIVERY

The five original skin wheals are satisfactorily placed for the application of towel clips to hold the sterile drapes in position during delivery.

If nurses or other attendants support the patient's legs, this will contribute to her comfort and facilitate delivery. A small pillow in the lumbar region helps to prevent backache.

Following the above infiltration, the patient is allowed to bear down with the contractions for fifteen or twenty minutes before anything active is done about delivery. At this time, if delivery is not progressing rapidly, an episiotomy is performed, sterile green soap solution is instilled in the vagina, and the forceps are gently applied to the baby's head. With succeeding contractions, gentle traction is exerted on the forceps at the time the patient bears down. Traction is discontinued as the contraction passes. Unless there is cephalopelvic disproportion or malrotation of the head, the delivery is promptly carried out. One or two minims of posterior-pituitary extract will often obviate forceps delivery.

It is almost never necessary to give inhalation analgesia at the time of contractions after the infiltration has had time to take effect. On the other hand, a few breaths of nitrous oxide and oxygen or ether with each pain will suffice to control patients with nervous dispositions.

One-sixth grain of morphine sulfate is given subcutaneously as soon as the baby is born.

After delivery the perineum is expeditiously sutured. If the perineal laceration extends beyond the level of the original infiltration, a slight amount of solution injected at the upper angle will promptly produce anesthesia of the rectovaginal tissues so that the laceration can be repaired without discomfort to the patient.

Expulsion of the placenta completes the delivery.

PRACTICAL CONSIDERATIONS

Period of anesthesia. Anesthesia is usually adequate for one and a half to two hours from the time of infiltration.

Local tissue relaxation. The local infiltration of tissues with novocain produces muscular relaxation. This facilitates delivery and helps to prevent extensive episiotomies or perineal lacerations.

Blood loss. Since the patient is not under general anesthesia, local tone of the uterine muscle remains normal, with the result that bleeding is the same as in delivery without anesthesia. The suprarenin in the novocain solution prevents, through its action on the blood vessels, excessive bleeding from the perineal tissues.

General condition of the mother. The removal of pain stimuli with local anesthesia and the performance of episiotomy and low-forceps delivery avoid maternal exhaustion associated with a prolonged second stage of labor and the dangers that inevitably accompany inhalation anesthesia. The pulse rate and blood pressure are almost invariably comparable before and after delivery.

Very often, even with no inhalation analgesia at the time of the contractions, the mother has no sensation whatever of the birth of the baby, yet she is aware that she plays a part in the birth process because she pushes the baby out of the birth canal, either with or without assistance from the attending physician. She can see her baby as soon as it is born, and this often makes a profound and desirable impression on her psyche.

Condition of the baby. The baby responds to the birth process under local anesthesia just as if the delivery were conducted without anesthesia. In some respects it is probably in better condition, because the second stage of labor is shortened, thereby avoiding undue molding of the head and diminishing the dangers of cerebral anoxia. The

baby breathes and cries spontaneously and promptly in 95 per cent of the cases, often crying before the entire body is delivered. That atelectasis may occur from depression of respiration from anoxemia due to causes other than analgesia and anesthesia is indubitable, but atelectasis should be exceedingly rare when babies are delivered under local anesthesia. Furthermore, the gentleness that is possible in performing forceps delivery with infiltration anesthesia diminishes to a minimum the dangers of cerebral damage.

CONCLUSIONS

Assuming that local perineal anesthesia has not been used extensively in obstetrics because of a lack of appreciation of the ease with which deliveries may be conducted with this method, an attempt has been made to outline in some detail the exact technic of delivery under local anesthesia that, in the author's hands, has been eminently satisfactory in 64 cases. If the details of the conduct of labor and delivery outlined above are as scrupulously observed as the details recommended by surgeons in performing thyroidectomy under local anesthesia, the method is almost always successful. The preparation of the novocain solution, the conduct of the labor and the execution of the delivery are as important as the method of perineal infiltration. The procedure is, however, technically within the scope of any physician qualified to undertake obstetrics.

It is believed that small doses of sedatives during labor, in addition to local anesthesia for delivery, give the most satisfactory results in normal and low-forceps deliveries. Furthermore, spontaneous breech deliveries,⁹ manual rotation of the head, Scanzoni's operation,⁸ the delivery of face and brow presentations after flexion, and even mid-forceps deliveries can often be conducted under local infiltration anesthesia.

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REFERENCES

1. Gellhorn, G. Local and spinal anesthesia in gynecology and obstetrics. *J. A. M. A.* 61:1354-1358, 1913.
2. King, R. W. Perineal anaesthesia in labor. *Surg., Gynec. & Obst.* 23:615-618, 1916.
3. Gellhorn, G. Local anaesthesia in gynecology and obstetrics. *Surg., Gynec. & Obst.* 45:105-109, 1927.
4. Rose, D. Local anaesthesia in first and second stage labor. *New Eng. J. Med.* 201:117-125, 1929.
5. Torland, T.: Perineal anesthesia in obstetrics. *Northwest Med.* 29:312, 1930.
6. Greenhill, J. P.: Local infiltration anesthesia in obstetrics. *South. M. J.* 26:37-44, 1933.
7. O'Connor, C. T. Local anesthesia in obstetrics. *New Eng. J. Med.* 210:788-792, 1934.
8. Walker, A. T. Regional anesthesia in conduct of labor. *Am. J. Obst. & Gynec.* 32:60-67, 1936.
9. Urnes, M. P. and Timmerman, H. J. Breech delivery: comparative study of local and general anesthesia. *J. A. M. A.* 109:1616-1618, 1937.
10. Bushnell, L. P. Trend of obstetrical amnesia and analgesia: collective review. *Internat. Abstr. Surg.* 67:155-164, 1938.
11. Greenhill, J. P. Infiltration versus spinal anesthesia in obstetrics and gynecology. *J. A. M. A.* 102:28-32, 1934.
12. Adam, L. Some principles of local anaesthesia. *Surg., Gynec. & Obst.* 60:675-679, 1935.
13. Gray, H. *Anatomy of the Human Body*. Twenty-second edition. 1371 pp. Philadelphia: Lea & Febiger, 1930.
14. Taft, C. B. personal communication.
15. Hoag, C. L. The application of anoci-association to obstetrics: the combined use of scopolamine, nitrous-oxide-oxygen and local infiltration. *Surg., Gynec. & Obst.* 23:612-614, 1916.
16. O'Hearn, E., and Knauer, C. H. Technic of injection of pudendal nerve and branches of small sciatic nerve with observations made on one hundred cases of delivery. *Am. J. Obst. & Gynec.* 26:444-445, 1933.

CARCINOMA OF THE ESOPHAGUS DEVELOPING IN BENIGN STRICTURE*

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ALTHOUGH the etiology of carcinoma of the esophagus is unknown, the fact that trauma and chronic irritation may play a part in its development, as elsewhere in the body, is evidenced by the occasional development of carcinoma in a benign stricture. In the literature 31 cases of carcinoma developing in benign lesions are reported. To these I add 2 cases of my own, from a total of 40 cases of carcinoma. A complete tabulation is given in Table 1.

Certain comments on the table mentioned above are indicated. Statistically the figures are not of great value, since they are incomplete, not only in the total number of cases of esophageal carcinoma,

but also in the etiology of the stricture. In 220 cases of carcinoma of the esophagus (Feilchenfeld,⁵ Redlich,⁷ Bejach,⁹ Benedict), benign stricture was considered a predisposing factor in 12, an incidence of 5.5 per cent. Actually the incidence is probably very much lower than this, for of course many physicians seeing carcinoma of the esophagus may never see a case arising in a benign lesion. Of 33 cases listed above, 16 are known to have occurred following lye burns. In many others, the etiology is not given. Röpcke's³ case, which followed trauma and scarring owing to a bone fragment, is most interesting and, apparently, very unusual. Vinson's¹⁶ cases associated with cardio-spasm and hysterical dysphagia are of interest but not altogether convincing. Indeed, in his recent

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excellent treatise¹⁸ on the esophagus, he refers to 6 cases that followed lye burns, and states, "Carcinoma rarely occurs in the esophagus in associa-

TABLE 1. *Incidence of Primary Benign Lesions in Cases of Carcinoma of the Esophagus.*

AUTHORITY	DATE	CANCER OF ESOPHAGUS		ETIOLOGY OF BENIGN LESION	INCIDENCE OF PRIMARY BENIGN LESIONS
		ALL CASES	CASES WITH PRIMARY BENIGN LESIONS		%
Neumann ¹	1861	—	1	—	—
Zenker ²	1874	—	1	—	—
Röppke ³	1889	—	1	Foreign body	—
Canell ⁴	1896	—	1	Lye	—
Feilschenfeld ⁵	1901	58	4	Lye (1)	6.9
Telch ⁶	1904	—	1	Lye	—
Redlich ⁷	1907	55	2	—	3.6
Morton ⁸	1912	—	1	Lye	—
Rejacht ⁹	1917	67	4	—	6.0
Yamagata and Endo ¹⁰	1919	—	1	—	—
Höfsten ¹¹	1919	—	1	Lye	—
Schürmer ¹²	1923	—	1	—	—
Heeninger ¹³	1932	—	1	Lye	—
Magnoussin ¹⁴	1932	—	1	Lye	—
Mjerson ¹⁵	1933	—	1	Lye	—
Vinson ¹⁶	1933	—	3	Lye Cardiospasm Hysterical dysphagia	—
de Zalka ¹⁷	1935	—	1	Lye	—
Vinson ¹⁸	1940	—	5	Lye (5)	—
Benedict	1940	40	2	Lye Congenital	5.0
Totals			33	Lye (16) Miscellaneous (4) Not reported (13)	

tion with other obstructive lesions"; and later, in discussing complications of hysterical dysphagia, he says, "Carcinoma has not occurred with sufficient frequency in patients with hysterical dysphagia to justify the assumption that the two conditions are related etiologically." He therefore seems to have modified his earlier opinion. Rake,¹⁹ on the other hand, reports having seen 3 cases of carcinoma of the esophagus that arose in association with achalasia of the cardia. He postulates the theory that achalasia, or failure of the cardia to relax, leads to stagnation, esophagitis, shallow ulcers, epithelial hyperplasia and benign papillomas that eventually become malignant. This theory applies equally well to the occurrence of carcinoma in any benign stenosis of the esophagus. In any event, a lye burn is the one outstanding type of benign esophageal lesion that seems to play a role in the later development of carcinoma.

My first case, however, concerns a patient whose carcinoma arose in an area of congenital stenosis.

CASE REPORTS

CASE 1. D. G. (P. H. No. 162587), a 58-year-old man, was admitted to the Phillips House on November 14, 1938,

complaining of inability to swallow food. The history dated back to infancy. He had always regurgitated, and at the age of 17 had been unable to tolerate solid food until bougies were passed. Since then there had always been more or less difficulty in swallowing, although the patient had been able to get along quite satisfactorily until 1 month before entry, when he began to have low substernal distress. For 4 days before entry, he had been



FIGURE 1. Case 1.

X-ray appearance of a carcinoma of esophagus developing in a congenital stricture.

unable to take adequate amounts of food and had regurgitated blood-streaked material, together with all food eaten.

Physical examination revealed no relevant findings.

X-ray examination of the esophagus (Fig. 1) was interpreted as follows:

There is an annular constriction of the esophagus, about 5 cm. long, just below the bifurcation of the trachea; the esophagus above it is considerably dilated, and there is visible peristalsis in it, and at times spasmotic contraction. The outline of the esophagus above the constriction is somewhat blurred, suggesting prominent mucosal folds. In the constricted area, the margins are distinctly ragged, and normal mucosa is not visible. Below the involved area, the esophagus appears normal. There is no evidence of an extrinsic mass. Films of the chest show no evidence of disease

in the lungs, pleura or mediastinum. The heart shadow is moderately enlarged. Conclusions: the examination shows moderate enlargement of the heart, stricture of the esophagus at the junction of the middle and lower thirds and dilatation of the esophagus above the stricture; it also shows changes in the mucosal pattern, which could be due to either an inflammatory process or a new growth.

Esophagoscopy under local anesthesia on November 16 was reported as follows:

The upper esophagus showed some thickening and reddening of the mucosa, indicative of chronic



FIGURE 2. Case 1.

Pathologic fracture of the scapula—metastatic from a carcinoma of the esophagus.

esophagitis. At a point 35 cm. from the upper incisors, there was marked narrowing of the lumen, with a red, slightly nodular and slightly ulcerating lesion that appeared to involve the right lateral wall, and part of the anterior and posterior walls. Several specimens of tissue were taken from this region. Esophageal bougies (No. 12 to No. 20) were passed through the stenotic area into the stomach; No. 20 was definitely tight. There was only a small amount of bleeding.

The biopsied specimens were reported as showing no evidence of cancer. The examination was therefore repeated on November 25, when more satisfactory specimens of tissue were obtained; these were reported as showing highly undifferentiated carcinoma (Grade IV). In spite of x-ray treatment, esophagoscopy and tube feeding through an inlying duodenal tube, passed at

the time of esophagoscopy, the patient failed very rapidly, and died on January 6, 1939.

An interesting complication in this patient was the development of a pathologic fracture through the neck of the scapula, sustained when he was being moved from his bed to a litter. X-ray examination of the scapula (Fig. 2) on November 28 was reported as follows:

The films show a fracture through the neck of the scapula; and near the lower border of the scapula, in the region of the fracture, there is a round, sharply defined area of diminished density, about 1 cm. in diameter, which has the general appearance of a metastatic nodule. The other bones visible on these films show no evidence of disease.

Autopsy. Post-mortem examination showed epidermoid carcinoma (Grade IV) of the esophagus, with metastases to the mediastinal, retroperitoneal and mesenteric lymph nodes, and to the liver, kidney, jejunum, pleura, vertebrae and scapula.

The highly undifferentiated epidermoid carcinoma apparently developed in this patient in the region of an old congenital stricture. There was no history of ingestion of lye, or of a foreign body, yet the difficulty in swallowing dated from infancy. The conclusion therefore seems justifiable that this carcinoma arose in an area of chronic irritation, produced by a congenital stricture. The diagnosis was positively established by esophagoscopy, and bouginage was carried out under direct vision through the esophagoscope.

CASE 2. H. W. (B. M. No. 226639), a 35-year-old man was admitted to the Baker Memorial Hospital on December 5, 1939, complaining of difficulty in swallowing of 34 years' duration. At the age of 15 months he swallowed lye and required a gastrostomy for feeding. Dilatations of the esophagus were performed, so that he was finally able to swallow solid food. However, about once a year food would stick in his throat and bouginage was necessary.

Physical examination was essentially negative.

X-ray study of the esophagus (Fig. 3) on December 8 was reported as follows:

The esophagus shows diffuse reduction in its size, as well as five constrictions about equally distributed from the upper orifice to the lower orifice. There is no peristaltic activity at any point in the esophagus. The upper end shows the most marked constriction. The mucosa of the segment of the esophagus, about 5 cm. in length, just opposite the episternal notch, appears grossly irregular, and at one point there is a definite ulcer, about 1.5 cm. in diameter. This ulceration apparently lies on the right posterior wall and is surrounded by an area of induration, about 3 cm. in length. There is no obvious soft-tissue mass, and the trachea is neither displaced nor deformed. The lower end of the esophagus is the next smallest point, but this does not produce obstruction. There is a diaphragmatic hernia. Conclusions: the picture is extremely complicated owing to the old diffuse fibrosis secondary to the ingestion of lye; I believe that the lesion in the upper end that appears ulcerated is due to carcinoma.

Esophagoscopy under local anesthesia was done on December 6. This was before the x-ray study. It was reported as follows:

The epiglottis was normal. The arytenoids and vocal cords were of normal size and motility. The lesion could not be demonstrated with the esophageal speculum. A 9-45 esophagoscope passed about 1 cm. beyond the cricopharyngeal muscle, where it met obstruction by a constricting lesion, apparently a benign stricture. Esophageal bougies (No. 10 and No. 12) passed through the stricture for a distance of about 15 cm., where they met some resistance; No. 12 was tight. No view could be obtained beyond the stricture of the area suspected of being cancerous. It

pathological report, however, esophagoscopy was repeated, December 12, and reported as follows:

The esophagoscope passed readily to a point about 2 cm. below the cricopharyngeal muscle, where it met complete obstruction. The small lumen previously established was readily visualized. Esophageal bougies (No. 8 to No. 22) passed without difficulty through the stricture; No. 24 seemed tight and could not be passed. After dilatation of the narrowing, it was impossible to see clearly any nodular lesion, but the ball forceps and cutting forceps were passed through the stricture; specimens were taken of the region beyond the stricture. At least five or six satisfactory specimens were obtained, and had the appearance of cancerous tissue.

The pathological report was slowly growing epidermoid carcinoma (Grade 1).

Following the second esophagoscopy, there was further improvement in swallowing, and the patient was able to take an adequate soft-solid diet. He gained so much in weight and strength that an attempt at esophagectomy was advised. A preliminary jejunostomy was performed January 6, 1940. On February 5, the esophagus was explored through a transverse neck incision and also through a thoracotomy incision. The upper edge of the tumor was felt at the thoracic inlet, but the esophagus could not be separated from the trachea, because of adhesions. The lung was also adherent and intimately fused to the mediastinum. The mediastinum over the esophagus and trachea was a firm mass of inflammatory tissue. The esophagus, therefore, could not be isolated either above or below the tumor, so that the attempt at esophagectomy was abandoned. Following operation, the temperature, pulse and respirations were elevated, with sepsis in the neck wound. From this point on he failed rapidly, and died February 22. Autopsy was not permitted.

In this patient there was a history of the ingestion of lye at the age of fifteen months, followed by multiple strictures of the esophagus, with development of epidermoid carcinoma (Grade 1) after a lapse of about thirty-four years. Biopsy through the esophagoscope was difficult in this patient owing to narrowing above the site of the neoplasm. After dilatation, however, a satisfactory biopsy was obtained. Esophagectomy was impossible owing to multiple adhesions, presumably largely the result of the lye injury.

CONCLUSIONS

Two cases of carcinoma of the esophagus developing in benign stricture are reported. One arose at the site of a congenital stricture, the other at the site of a lye burn.

The literature has been carefully reviewed, and the possible etiologic factors briefly discussed. Carcinoma developing in a benign stricture is rare. It has been more commonly reported following lye burn than in association with any other type of benign stricture.

The importance of esophagoscopy under local



FIGURE 3. Case 2.

Multiple lye strictures of the esophagus, with carcinomatous degeneration of the upper stricture.

was not thought wise to attempt the removal of tissue blindly through the stricture. Tissue from a slight roughening of the mucosa on the posterior wall proximal to the stricture was removed and sent in Bouin's solution to the laboratory. Conclusions: probably benign stricture of the upper esophagus due to lye; carcinoma not excluded.

The pathological report showed no evidence of carcinoma.

Following the dilatation, the patient's swallowing was very much improved. Because of the negative

anesthesia in the diagnosis and treatment of these cases is emphasized.

REFERENCES

1. Neumann, E. Stricture des Oesophagus, durch eine caneroide Narbe bedingt, mit consecutiver Pneumonie. *Virchows Arch. f. path. Anat.* 20:142-152, 1861.
2. Zenker, F. A. and v. Ziemssen, H. Krankheiten des Oesophagus. *Handb. d. spec. Path. u. Therap.* 7:1-298, 1874.
3. Röpeke, A. Beitrag zur Aetiologie der Oesophaguscarcinome. 12 pp. Kiel C. Bockel, 1889.
4. Cattell, H. W. Cancer of the oesophagus following a stricture, due to the taking of lye, with recent metastasis to the liver. *Tr. Path. Soc. Philadelphia* 17:18, 1896.
5. Feilchenfeld, J. Beiträge zur Statistik und Casuistik des Carcinoms. 70 pp. Berlin E. Ebering, 1901.
6. Teleky, L. Die Laugenverätzungen der Speiseröhre. *Ztschr. f. Heilk.* 25:1-58, 1904.
7. Redlich, W. Die Sektuons Statistik des Carcinoms am Berliner Städtischen Krankenhaus am Urban nebst kasuistischen Beiträgen. *Ztschr. f. Krebsforsch.* 5:261-325, 1907.
8. Morton, J. Notes of a case of stricture of the oesophagus. *Glasg. M. J.* 78:267-273, 1912.
9. Bejach, H. E. Beiträge zur Statistik des Carcinoms. *Ztschr. f. Krebsforsch.* 16:159-216, 1917.
10. Yamagiva and Endo: cited by Magnusson.¹⁴
11. Hoston. cited by de Zalka.¹⁷
12. Schirmer, O. Zur Entstehung der Oesophaguskarzinome. *Arch. f. Verdauungskr.* 31:365-373, 1923.
13. Henninger, H. Oesophaguscarcinom bei einer 16 Jahre alten Strikt. *Deutsche Ztschr. f. Chir.* 237:632-634, 1932.
14. Magnusson, R. Cancer of oesophagus after corrosion with lye. *Acta chir. Scandinav.* 69:473-478, 1932.
15. Myerson, M. C. Carcinoma of the esophagus engrafted upon a lye stricture of twenty-six years' duration. *Ann. Otol., Rhin. & Laryng.* 42:1224-1226, 1933.
16. Vinson, P. P. and Kennedy, F. S. The association of benign and malignant lesions of the esophagus. *Am. J. M. Sc.* 186:660-665, 1933.
17. de Zalka, E. Cancer of the esophagus in a stricture caused by potassium hydroxide. *Acta oto laryng.* 22:270-274, 1935.
18. Vinson, P. P. *The Diagnosis and Treatment of Diseases of the Esophagus.* 224 pp. Springfield, Illinois Charles C Thomas, 1940.
19. Rake, G. Epithelioma of oesophagus in association with achalasia of cardia. *Lancet* 2:682, 1931.

INTRAVENOUS DRIP ADMINISTRATION OF AUTONOMIC DRUGS*

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RECENTLY the introduction of drugs into the body by the method of intravenous drip has received great impetus by the work of Hirshfeld, Hyman and Wanger,¹ Hyman and Hirshfeld² and others.³⁻⁶ The advantages of the drip method are obvious. Not only may subtoxic amounts of drugs be infused at any desired rate, but a continuous action of a drug may be maintained for a long time. Furthermore, the undesirable reactions following massive administration of a drug may be prevented by slow intravenous infusion. For example, in the treatment of asthma, a single large dose of epinephrine may produce a severe reaction, whereas repeated doses of the drug may stop the asthmatic attack if it is severe or prolonged. Colmes⁷ has demonstrated that slow intravenous drip of adrenalin may overcome these disadvantages in the treatment of severe cases of asthma.

In the treatment of other conditions, the method of intravenous drip offers possible advantages. Thus it occurred to us that a group of autonomic drugs, the actions of which one of us⁸ has studied intensively, might have clinical usefulness when given by slow intravenous infusion. Accordingly we studied the effect by this method of certain drugs: adrenergic or sympathomimetic and cholinergic or parasympathomimetic.

The patients were passive cases of dementia praecox; their general physical condition was

good and their pharmacologic reactions were known to us from previous work in autonomic pharmacology.

The drugs were added to physiologic saline solution. The rate at which the solutions were given depended on the effects obtained; it was varied from patient to patient and was easily controlled by means of a Kelly drip tube interposed in the infusion system. The effect that served as a guide with the adrenergic drugs was a rise in blood pressure and its constant maintenance at the desired level, and with the parasympathomimetic drugs, either moderate sweating or a definite drop in blood pressure. In every case the time of the experiment lasted from one to two hours.

RESULTS

Adrenergic or Sympathomimetic Drugs

Amphetamine (Benzedrine) sulfate. Any desired level of blood pressure was maintained with solutions containing 50 mg. in 200 cc., depending on the rate of administration. As with the intravenous or intramuscular injection of amphetamine sulfate,⁹ the pulse rate showed no change, unless the blood pressure was raised to moderate or high levels. A typical experiment is as follows:

J. H. At 9:55 a.m. the blood pressure was 132/80, the pulse rate 72. Amphetamine sulfate was started at about 30 drops per minute. At the end of 7 minutes the blood pressure was 148/90, the pulse rate 68. In 15 minutes the blood pressure was 160/90, the pulse rate 68. One half hour after the experiment started, at 15 drops per minute the pulse rate was still 68, the blood pressure 164/90. In 1 hour the blood pressure had reached 176/100, the pulse rate was 68, and the rate of administration was reduced to 12 or 15 drops per minute. The

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blood pressure then remained at the level of 176/100 until the end of the experiment, 2 hours after its inception.

Thus in this patient, as in the others in whom this drug was used, it was possible to maintain a uniform hypertension with from 15 to 30 drops a minute—a relatively small amount of liquid that could not in any way overburden the heart or circulation. In most patients, increased talkativeness occurred.

Beta-para-hydroxyphenylisopropylamine (Paredrine). Since Paredrine has a relatively more powerful effect on the blood pressure than amphetamine sulfate,¹⁰ weaker concentrations were used than with the latter drug. Thus 20 mg. of Paredrine in 200 cc. of physiologic saline, given at a rate ranging between 20 and 50 drops a minute, maintained the blood pressure at a high level for any desired period. As with amphetamine sulfate, slowing of the pulse depended on the height of the blood pressure.

Propadrine hydrochloride. Propadrine was given in stronger concentrations than the former two sympathomimetic drugs because of its relatively less powerful effect on the blood pressure. Thus 200 mg. in 200 cc. of physiologic saline at a rate varying between 30 and 60 drops a minute gave the desired increases in the blood pressure. The pulse rate diminished, depending on the degree of increase of blood pressure. The results obtained with Propadrine, as with Paredrine, differed from those with amphetamine sulfate in that psychologic effects were absent.

Adrenalin. One to 2 mg. of adrenalin in 200 cc. of physiologic saline solution, given at a rate between 20 and 30 drops a minute, caused an increase in the blood pressure. With the rise in blood pressure, however, the patient experienced discomfort, which was associated with pallor and weakness. Diminution of the rate of administration caused sudden falls in blood pressure and a disappearance of the undesired side effects. This drug, because of its rapidity of action, seemed more difficult to control than amphetamine sulfate, Paredrine or Propadrine.

Cholinergic or Parasympathomimetic Drugs

Acetyl-beta-methylcholine chloride (Mecholyl). From 10 to 20 mg. of Mecholyl in 200 cc. of physiologic saline was used. The mild effects of the drug,—that is, sweating, salivation, lacrimation, increased pulse rate and diminution of blood pressure,—could be obtained in any degree, depending on the rate of infusion; mild sweating and salivation could be obtained so that little, if any, effect on the vascular system resulted. When the drug was given at a greater speed, the latter changes

could also be obtained. These results corroborated previous experiments in which it was shown that an increased rather than a diminished pulse rate was the usual effect of small doses of Mecholyl.¹¹ One of the patients had urgency of urination during the administration of the drug. It is to be kept in mind that with the administration of Mecholyl by any method, atropine sulfate should be ready for intravenous administration to check ill effects, since some people are definitely oversusceptible to the drug.

Furfuryl trimethyl ammonium iodide (Furmethide). Furmethide was given in doses of 50 mg. in 100 cc. of physiologic saline. This drug, which we previously studied,¹² showed many of the parasympathomimetic effects that follow the administration of Mecholyl, that is, flushing, sweating and increased pulse rate. Unlike Mecholyl, however, it caused a slight increase in the blood pressure. The degree of effect of the drug could be readily maintained according to the speed of infusion.

SUMMARY

The sympathomimetic drugs, amphetamine (Benzedrine) sulfate beta-para-hydroxyphenylisopropylamine (Paredrine) and Propadrine hydrochloride may be given by the intravenous drip method for a prolonged period. A rise in blood pressure to a desired level can easily be obtained, and can be maintained indefinitely. The effect obtained with adrenalin is not so satisfactory as that with amphetamine sulfate, Paredrine or Propadrine, since it is difficult to maintain a continuous hypertension without undesirable side effects.

The parasympathomimetic drugs, acetyl-beta-methylcholine chloride (Mecholyl) and furfuryl trimethyl ammonium iodide (Furmethide), may likewise be administered by the intravenous drip method, producing constant physiologic effects over a prolonged period, the rate of the effect being proportionate to the rate of drip administration.

From the clinical point of view, the drip method of administering the sympathomimetic drugs may be useful. For example, amphetamine sulfate, Paredrine or Propadrine may be added to fluids given during the course of operations when it is desirable to increase or prevent a fall in blood pressure. For such purposes these drugs may be more useful than adrenalin in certain cases.

Amphetamine sulfate, as we have shown elsewhere,^{13, 14} has an opposing effect on the action of the barbiturates. We suggest, therefore, its utilization by the drip method in the treatment of barbiturate intoxication.

Since Mecholyl and other parasympathomimetic drugs are useful in the control of postoperative distention of the bladder and bowel, it is also suggested that the drip method may be efficacious in controlling these complications.

REFERENCES

1 Hirshfeld, S, Hyman, H T and Wanger, J. J. Influence of velocity on the response to intravenous injections *Arch. Int Med.* 47:259-287, 1931.
2 Hyman, H T and Hirshfeld, S Studies of velocity and response to intravenous injections. technic of intravenous drip in clinical practice. *J. A. M. A.* 96:1221-1223, 1931
3 Hyman, H T. and Touroff, A S W. Therapeutics of the intravenous drip further observations *J. A. M. A.* 104:446 451, 1935
4 Hyman, H T, Chargin, L and Leifer, W. Massive dose arsenotherapy of syphilis by the intravenous drip method. five-year observations *Am J M Sc* 197:480 485, 1939
5 Weiss, S and Ellis, L B. The comparative effects of the intravenous administration to man of acetylcholine and acetyl β methylcholine. *J Pharmacol & Exper Therap.* 52:113 120, 1934.

6. Porter, H. B. Intravenous drip: review of the literature and technique of this method of fluid administration. *Mil. Surgeon* 80 192 201, 1937.
7. Colmes, A. Recent advances in the treatment of hay fever and asthma *M. Clin. North America* 19:1467-1492, 1936.
8. Myerson, A. Human autonomic pharmacology. XII. Theories and results of autonomic drug administration. *J. A. M. A* 110:101-103, 1938.
9. *Idem.* The rationale of amphetamine (benzedrine) sulfate therapy *Am. J. M. Sc.* 199:729-737, 1940.
10. Loman, J., Rinkel, M. and Myerson, A. Comparative effects of amphetamine sulfate (benzedrine sulfate), parendrine and propadrine on the blood pressure. *Am. Heart J.* 18:89-93, 1939.
11. Myerson, A., Loman, J. and Dameshek, W. Physiologic effects of acetyl-beta-methylcholine (mecholyl) and its relationship to other drugs affecting the autonomic nervous system. *Am. J. M. Sc.* 193 198-214, 1937.
12. Myerson, A., Rinkel, M., Loman, J. and Dameshek, W. The effect of furfuryl trimethyl ammonium iodide on various autonomic functions in man. *J. Pharmacol. & Exper. Therap.* 68:476 481, 1940
13. Myerson, A. The reciprocal pharmacologic effects of amphetamine (benzedrine) sulfate and the barbiturates. *New Eng. J. Med.* 221:561 564, 1939.
14. Myerson, A., Loman, J., Rinkel, M. and Lesses, M. F. The effect of amphetamine (benzedrine) sulfate and parendrine hydrobromide on sodium amylal narcosis. *New Eng. J. Med.* 221:1015 1019, 1939.

CARCINOMA OF THE CERVIX*

A Review of 200 Cases Treated with Radium

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ALL the cases of carcinoma of the cervix reviewed in this paper were treated with radium only, and the therapy administered by the author or his associate, Dr. George F. Dwinell. With the exception of the few cases treated during the first two years, in which the dose was somewhat less than that subsequently adopted, the therapeutic dose given and the method of application have been practically uniform throughout. There have been minor technical modifications of the routine application methods, and there have been minor variations in the total irradiation dose, necessitated by individual requirements. All patients treated from 1920 to 1934 are included, and all were followed until five years had elapsed without known recurrence or until death ensued.

The total number of patients treated was 200. Of these, 185 had primary carcinoma of the cervix, and 15 had carcinoma of the cervical stump. The five-year survival in the patients with primary carcinoma of the cervix was 70 out of 185, or 37 per cent, whereas that of the patients with carcinoma of the cervical stump was 3 out of 15, or 20 per cent. Of the 73 patients living over five years, 30 have survived from ten to nineteen years after treatment.

The average age of the patients with primary cervical carcinoma was forty-nine years, the youngest being twenty-six and the oldest eighty-four.

The average age of patients with carcinoma of the stump was fifty-two years, the youngest being thirty-four and the oldest sixty.

In all cases the diagnoses were confirmed by slides from specimens taken before treatment was instituted. Grading was not adopted by the pathologist as a routine procedure until 1930, so that no grading tabulation can be included in this

TABLE 1. Classification of Cases According to Involvement.

	TOTAL CASES		CASES SURVIVING 5 YEARS	
	NO.	PER CENT	NO.	PER CENT
Stage I	38	20	24	63
Stage II	21	11	11	52
Stage III	98	53	35	35
Stage IV	28	15	0	
Totals	185		70	

review. Squamous-cell carcinoma was the histologic finding in every case of primary carcinoma of the cervix, whereas in the 15 cases of carcinoma of the stump, adenocarcinoma and an unidentified carcinoma were each found in 1, and squamous-cell carcinoma in 13.

Each primary carcinoma of the cervix was graded according to the amount of involvement of the cervix and adjacent tissues, using the League of Nations classification as a basis. The number of cases and the results of treatment in each stage are shown in Table 1. These figures are both interesting and informative, and correspond well with similar reports by other clinicians. They

*Read by title at the annual meeting of the New England Surgical Society, Poland Spring, Maine, September 27-28, 1940

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also confirm the oft-repeated statement that curability of cancer depends on early recognition and early treatment. The mortality rate increased proportionately with tissue involvement.

The table demonstrates the preponderance of Stage III (moderately advanced) cases. Greater curability in early carcinoma is proved by the fact that 63 per cent of the Stage I patients survived. Even this percentage is a little low, but is accounted for by 2 of the Stage I patients who were only twenty-six years old and did not survive. Only 1 patient under thirty years of age survived, and she is living without recurrence twelve years after treatment. As might be expected, there were no survivals among the Stage IV patients.

Although we have used x-ray therapy in addition to radium in the treatment of carcinoma of the cervix since 1934, the cases here reviewed and treated from 1920 to 1934 received only radium therapy. The basic principles of radium therapy, adopted early, have been continued without change.

Each patient was given $\frac{1}{2}$ gr. of Pantopon and $1\frac{1}{2}$ gr. of Nembutal one hour before the treatment, and no general anesthesia was used unless the patient was very unco-operative. The cervical canal was slowly and carefully dilated with Hanks dilators. Using 100 mg. of radium in two brass screens (2.0-mm. wall), 75 mg. was placed in the cervical canal and 25 mg. just above, for twenty hours. The second day following this, another treatment was given with the same amount of radium in a T tube, with 50 mg. in the canal and 50 in the crosspiece, the crosspiece being either anteroposterior or transverse, as indicated by the location of the lesion. This applicator remained for eighteen hours. With all treatments, the vagina was firmly packed with gauze and an inlying catheter placed in the bladder. Three weeks later, the third and last treatment was given, usually a repetition of the first, for eighteen or twenty hours. These three treatments totaled 5600 to 5800 milligram hours.

It is believed that the spacing of treatments is important. It was found that the first two treatments, given within forty-eight hours of each other, and totaling 3800 milligram hours, were about all a patient could have without producing too intense bladder or rectal irritation. It was found that in three weeks practically all radium reaction had subsided; this was considered the best time for a third treatment, one that would

deliver another blow to any cancer cells that had not received a lethal dose.

The importance of this timing, which was decided on empirically, was subsequently found to approximate closely the theory of Coutard regarding the periodicity of susceptibility of cancer cells to irradiation.

In 9 of the 15 cases with carcinoma of the cervical stump, the supravaginal hysterectomy had been performed from two to fourteen years previously, and these can be considered as primary carcinomas of the stump. The other 6 obviously had carcinoma when operated on, since they came for treatment from one to twelve months after operation. In only 2 cases was there a definite pathological history of carcinoma in the uterus at the time of operation. In the others various reasons for hysterectomy were given, such as inflammation, fibroid and flowing (4 cases). The average duration of symptoms in the stump cases before treatment was six and a half months, somewhat less than the average for the cases with primary carcinoma. This tendency to seek examination earlier is probably because any flowing or discharge after hysterectomy is more alarming to the patient than abnormal flowing with the uterus intact.

Since 1934, we have treated an increasing number of cervix cases with the same radium technic, but with the addition of preliminary deep x-ray therapy to the pelvis through five ports, 1800 r to each port; it is hoped that in a few years another comparable group may be presented to evaluate the final results with the addition of x-ray therapy to the same radium technic.

SUMMARY

An analysis of results of radium treatment in 200 consecutive patients with carcinoma of the cervix is presented. All patients were treated with practically the same technic and dosage, given by one or the other of two physicians.

Total five-year survivals in 185 patients with primary carcinoma of the cervix numbered 70, or 37 per cent. Total five-year survivals in 15 patients with carcinoma of the cervical stump numbered 3, or 20 per cent.

It is hoped that a further report may be presented later, in which these results will be compared with those in a series in which the same radium technic will be supplemented by preliminary deep x-ray therapy.

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ENCEPHALOPATHY ASSOCIATED WITH SULFAMETHYLTHIAZOLE THERAPY*

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CINCINNATI

SO-CALLED "hemorrhagic encephalitis" is a frequently described pathologic picture, the cause of which has been attributed to many etiologic agents. The commonest causative factors are the heavy-metal compounds, such as the arsphenamines, and some of the alkaloids, especially those of the opiate group.¹ The morbid process resulting from intoxication by these chemicals is fairly uniform in each case. In the central nervous system, widespread damage of the smaller radicals of the vascular bed usually occurs. As a result, one finds extensive ring-shaped perivascular hemorrhages, confined for the most part to the white matter. Alpers,² Russell,³ Glaser, Imerman and Imerman,⁴ Alexander and Putnam⁵ and Roseman and Aring⁶ have pointed out the presence of focal perivascular areas of necrosis in addition to the perivascular hemorrhages in the encephalopathy produced by arsphenamine. This necrotic process may completely dominate the microscopic picture, so that the classic hemorrhagic phenomena, usually described on gross examination, may be entirely absent.

We are recording the clinicopathological findings in a case of hemorrhagic encephalopathy that occurred after the oral administration of sulfamethylthiazole. The report of such a complication has not been noted in the literature. The pathologic picture is unique in that the perivascular hemorrhages were confined rather rigidly to the gray matter of the cerebral hemispheres and to the gray structures of the brain stem. This localization is peculiar because the typical hemorrhagic encephalitis is confined chiefly to the white matter. The indications are that the precipitating factor of the sulfamethylthiazole encephalopathy may be a toxic reaction on the vascular bed of the central nervous system.

CASE REPORT

W.F., a 32-year-old Negro, was admitted to the Medical Service of the Cincinnati General Hospital on February 19, 1940, with a diagnosis of left-lower-lobe pneumonia. The patient had been enjoying fair health until

February 12, when he developed a mild upper respiratory infection. On February 16, while at work, he was seized with a severe pleuritic pain in the left chest, and he developed a cough. He felt quite ill and was sent to bed by his employer. On February 18 he had a severe, shaking chill followed by exacerbation of the chest pain and expectoration of blood-tinged sputum. At this time his wife noted that the patient appeared to be somewhat confused. A physician, summoned the following day, ordered the patient to the hospital.

The past history was of significance in that he had been employed as a shaker in a lead factory for 15 years, and hence had probably inhaled large quantities of lead dust. However, there was no history of colic, constipation, anemia or nerve palsies. The patient had enjoyed excellent health until 2 months prior to admission, at which time easy fatigability, weakness, a nonproductive cough and loss of weight were noted. He attributed these symptoms to overwork and irregular sleeping hours. He imbibed alcoholic beverages to a moderate degree. Several years before entry the patient had a penile lesion. The antisyphilitic therapy that followed was inadequate. He had had no recent antisyphilitic treatment.

On admission the temperature was 103.4°F., the pulse rate 100, the respiratory rate 26, and the blood pressure 124/68. The patient was well orientated and co-operative. He appeared to be acutely ill, and was drowsy. General physical examination revealed a well-nourished and well-developed colored man with a warm dry skin. The teeth were carious and the gums pyorrheic, but there was no lead line. The pharynx was moderately injected. The heart was of normal size, and there was a soft systolic apical murmur. Signs of consolidation of the lower lobe of the left lung were present. The remainder of the physical examination, including a careful neurologic survey, was essentially negative.

At 4 p.m. on the day of admission, sulfamethylthiazole therapy was initiated. The drug was administered orally in 60-gr. (4-gm.) doses every 4 hours, day and night. It was continued until 8 a.m. February 24, by which time the patient had received a total of 1680 gr. (112 gm.). Within 24 hours after admission the temperature had fallen to 99.2°F., and he appeared much improved. In the following 3 days, the patient continued afebrile, the cough abated and the chest findings indicated that the pneumonic process was undergoing satisfactory resolution. However, the patient was apathetic and drowsy. On the morning of February 24, he complained of vertigo and vomited several times, and sulfamethylthiazole was then discontinued. At 9 p.m., the patient vomited blood-tinged fluid projectily, there was profuse diaphoresis, and he complained of loss of vision. The blood pressure fell, and he became semicomatose. The pupils were widely dilated and reacted poorly to light. Fundus examination revealed fresh hemorrhages along the border of the superior temporal retinal artery of the right eye and in the macular regions of both eyes. On February 25 the patient was disorientated and irrational and still had amaurosis. There was no paralysis of the extremities, the tendon reflexes were normal, and no ab-

*This study was aided by a grant from the Charles E. Fleischmann Endowment.

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normal reflexes were elicited. At 1 p.m. on this day, 1 hour after a lumbar puncture was performed, the patient had a generalized convulsion, after which the right pupil was larger than the left, the right side of the mouth drooped, and the tendon reflexes on the right were hyperactive. The patient had two other generalized convulsions, lapsed in respiratory failure and died at 7 p.m. During the final 24 hours he was anuric.

The temperature varied from 103.6°F on the day of entry to 100.8 terminally. The pulse rate ranged from 60 to 100, and the respirations from 20 to 42. Sputum typing on admission revealed that the predominating organism was a Type 3 pneumococcus, no acid fast organisms were seen. Blood culture produced no growth. The blood Kahn reaction was positive. The blood sulfamethylthiazole levels were 10.8 mg per 100 cc on February 20, 13.3 mg on February 21 and 18.2 mg on February 22. On admission, the blood contained 12 gm of hemoglobin per 100 cc, and 3,700,000 red blood cells and 18,850 white blood cells per cubic millimeter. The differential count showed 80 per cent polymorphonuclear leukocytes, 16 per cent lymphocytes and 4 per cent monocytes. No stippling of the red blood cells was noted. The white cell count was normal by February 22, but on February 25 it rose to 12,800, with essentially the same differential picture noted above. The red cell count remained stationary. The urine contained a few white blood cells and a trace of albumin.

A lumbar puncture was performed on the afternoon of February 25. The initial pressure was not recorded, because the patient was extremely restless and could not be persuaded to relax. The cerebrospinal fluid was clear and colorless, and contained 15 lymphocytes per cubic millimeter and no red blood cells. The total protein content was 60 mg per 100 cc., the Wassermann reaction was negative.

Autopsy The autopsy was performed 15 hours after death. The pathological findings exclusive of those in the nervous system were resolving and organizing left lower lobe pneumonia, acute pleuritis, acute and chronic bronchitis with lobular pneumonia, chronic passive congestion of the lungs, healed tuberculosis of the hilar lymph nodes, chronic pulmonary emphysema, pin point hemorrhages in the subpericardium, the submucosa of the stomach and the submucosa of the urinary bladder, chronic active pericarditis, myocardial dilatation, atherosclerosis of the aorta and of the coronary and iliac arteries, toxic changes in the viscera with acute passive congestion, and chronic prostatitis. Post mortem blood cultures were negative. During the autopsy, portions of the brain, kidney and liver were removed, and analysis of their lead content made. As determined by the Kettering Laboratory (Dr Robert Kehoe), the lead levels in the brain were 0.35 mg per 100 gm of tissue, in the kidney 0.32 mg per 100 gm, and in the liver 1.75 mg per 100 gm. These values were considered unusually high and definitely abnormal.

Examination of the nervous system was limited to the brain, which weighed 1385 gm. The convolutions were moderately flattened and broadened, and the vessels of the meninges were markedly congested. The basilar meninges were slightly thickened. There was no obvious abnormality of the cranial nerves. The vessels of the circle of Willis contained scattered atheromatous plaques, and the circle was of normal configuration. There was a slight herniation of the uncus of the temporal lobe on both sides. There was a well defined cerebellar pressure cone.

The most notable feature of the brain, which was sec-

tioned 8 days after fixation in a 10 per cent solution of formaldehyde (USP), was the presence of discrete and confluent petechial hemorrhages scattered in the gray matter and nuclear structures (Fig 1). The tendency to symmetrical involvement was striking, and this symmetry was found wherever the vertical sections of the hemispheres and brain stem included comparable halves of the nervous system. The hemorrhages were bright red and tended to coalesce. Although these lesions were not profuse and extensive in the hemispheres, they were widespread, extending from the frontal to the occipital poles and sparing none of the lobes. The lesions were most marked in the tail of the caudate nucleus on both sides, where they measured 8 mm in diameter, and in the mammillary bodies. Smaller diapedetic hemorrhages were noted in the substantia nigra, thalamus and the gray matter of the convolutions. The white matter was entirely spared. The thalamus appeared swollen.

The sectioned brain stem showed a similar but much severer hemorrhagic lesion. Again the striking feature was the bilaterally symmetrical, coalescent, diapedetic hemorrhages involving the nuclear masses of the pons and medulla (Fig 2). The nuclei bordering on the floor of the fourth ventricle in the medulla and pons and the pontile and raphe nuclei were severely involved. The involved area on each side occupied approximately the dorsal fourth of the medulla. The lateral recesses of the fourth ventricle were filled with a soft clot, which obviously involved the choroid plexus. This hemorrhagic process extended into and destroyed a small portion of the adjacent cerebellar tissue on both sides. The remainders of the sectioned cerebellum, lower medulla and upper cervical cord were normal grossly.

Microscopic examination of various cortical areas and basal ganglia and representative portions of the brain stem confirmed the fact that the hemorrhagic process was limited strictly to the gray matter of these structures. Sections were stained by the hematoxylin and eosin, van Gieson, cresyl violet, Loyez, Bodian (1 per cent protargol) and benzidine (Lepehne-Pickworth) methods. The predominating lesion was diapedetic hemorrhage, which was widespread and consisted of discrete or confluent foci, in the center of each of which was a capillary or precapillary with hyperplastic or necrotic endothelium. Polymorphonuclear leukocytes were found in these hemorrhages and in the adjoining brain tissue. Blood pigment had diffused into the foci, and some of it had been ingested by macrophages. The hemorrhagic phenomena were most intense in the tail of the caudate nuclei, anterior nuclei of the thalamus, mammillary bodies and the paraventricular region of midbrain, pons and medulla. In the cerebellum, one small lobule, close to the midline and proximate to the brachia, was involved in the hemorrhagic softening (Fig 2). The entire lobule had partially lost its form, and there was some distribution of blood pigment throughout its gray and white matter. Here Purkinje cells were only rarely seen, and there was a marked loss of granular cells. The hemorrhage was diffuse and not limited to the area immediately surrounding the capillaries.

Besides these hemorrhagic lesions there were two other pathologic processes. In the gray matter of the cerebral hemispheres (cortex and basal nuclei) and brain stem there were a moderate number of discrete perivascular foci of necrosis. The center of each lesion contained a small capillary with necrotic or hyperplastic endothelium. Surrounding the vessel was a relatively acellular area that contained a few oligodendroglia and some so-called "ghost" nerve cells. These necrotic foci were usually de-

limited by a thin layer of neuroglial cells, one or two nuclei in thickness. The other characteristic lesions were areas of paling in the gray matter of the cortex, which were apparently not contiguous to the hemorrhagic or necrotic areas. These pale areas were relatively large

and neuronophagia were marked. In the superficial cortical layers, there were many polymorphonuclear leukocytes and microglia. In the cortical areas adjacent to the perivascular hemorrhage, there was also a moderate thinning of nerve cells, and the remaining cells showed

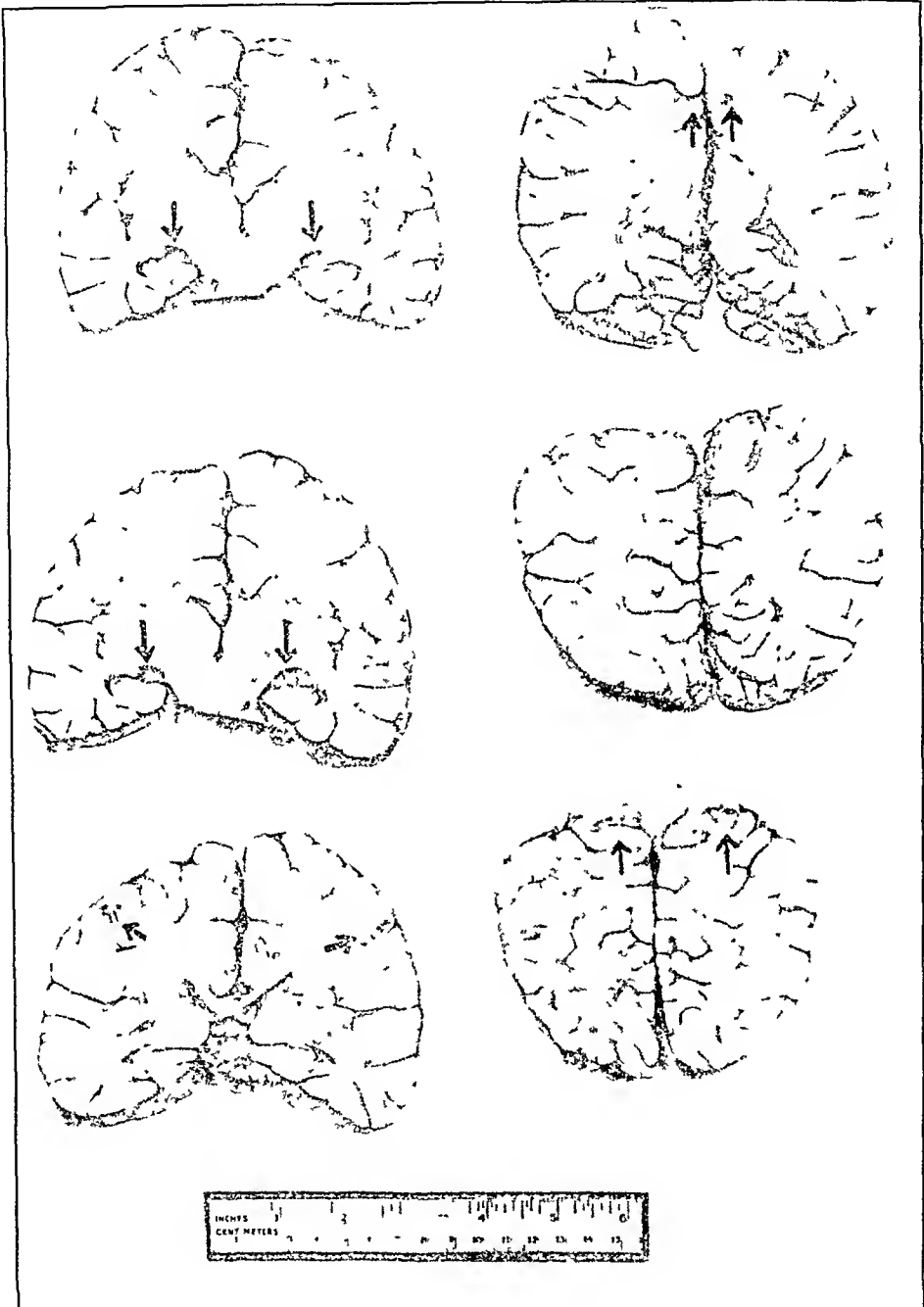


FIGURE 1. *Discrete and Confluent Petechial Hemorrhages Limited Macroscopically to the Cortex and Basal Ganglia.*

The cerebrum was sectioned vertically into blocks 1.5 cm. thick. Note the symmetrical arrangement of the lesions in the hemispheres (marked by arrows).

and contained swollen oligodendroglia and a few neurones, which showed severe anoxic changes.

The cortical architectonics in the areas containing the hemorrhagic lesions were markedly distorted. There was a notable absence of nerve cells, with an increase in neuroglia. Many ghost neurones were present. Sate

moderate to severe chromatolytic changes. The oligodendroglia of the gray and white matter was swollen and increased in amount. The leptomeninges, particularly over the sulci, contained generous amounts of polymorphonuclear leukocytes and lymphocytes in an exudate containing fibrin. There were also some large mononuclear

cells and a few phagocytes in the meninges. The vessels of the meninges were intensely congested.

An interesting neuronal change was noted in the hypothalamic nuclei, in which the nerve cells appeared to be most severely involved. They were markedly swollen, and there was an extrusion of Nissl granules from the cytoplasm of these cells into the surrounding tissue. The nuclei were absent. These hypothalamic cells appeared as though they had exploded. Satellitosis and neuronophagia were marked in this region.

There was marked congestion throughout the cerebral hemispheres and brain stem. This was noted in both the gray and white matter, particularly in the former. The capillaries and precapillaries showed severe changes, con-

associated perivascular foci of necrosis. Why one toxin should involve the white matter and the other the gray is not clear and needs further investigation.

The neuronal changes noted are evidently secondary to anoxia. Putnam and Alexander⁷ have pointed out that intermittent or isolated capillary closure in localized areas may produce no parenchymal degeneration, whereas closure of large areas of the capillary network, with consequent oxygen deprivation of the tissue, leads to necrosis.

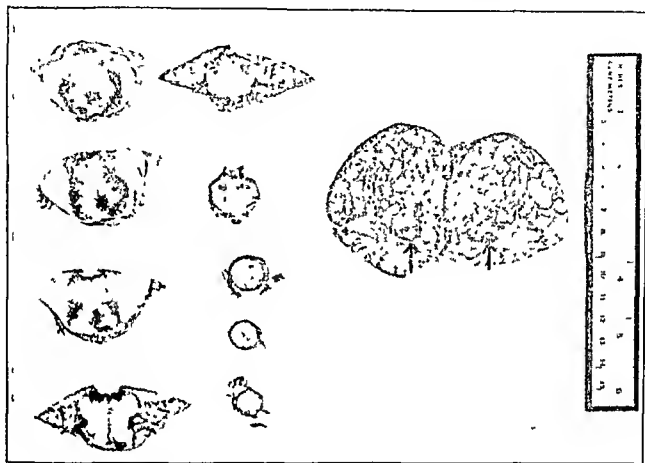


FIGURE 2. Confluent Petechial Hemorrhages in the Nuclear Masses of the Pons and Medulla.

The symmetrical arrangement of the lesions is striking. The brain stem was sectioned vertically into blocks 1 cm thick. The cerebellum was split in the mid-line, and disarticulated from the brain stem by cuts through the brachia. A soft clot involved the choroid plexus of both lateral recesses and extended into adjacent lobules of the cerebellum.

sisting chiefly of swollen or necrotic endothelium. The hyperplastic endothelium frequently occluded the lumens of the vessels. There were numerous, thick thrombi. The perivascular spaces were accentuated. There was no perivascular cuffing or inflammatory cells, and no histologic evidence of syphilis.

The pathological findings in this case of hemorrhagic encephalopathy are of unusual interest because of the tendency for the hemorrhagic and necrotic phenomena to be confined to gray matter. This is in contradistinction to the typical arsphenamine hemorrhagic encephalitis, in which the white matter is the focal point of attack. However, these two morbid processes have several points in common. Both demonstrate, in addition to the diapedetic hemorrhage, widespread and severe vascular disorder in the gray or white matter, with

However, in pathologic processes in which there is a haphazard endothelial proliferation, there is only an intermediate degree of capillary closure. The end result of this latter state, as noted by Putnam and Alexander, is a rarefaction of cortical neurones comparable to that produced by other forms of incomplete or temporary anoxia, except that it is apt to be more patchy in distribution. In the hemorrhagic encephalitis induced by arsphenamine and sulfamethylthiazole, two pathologic processes manifest themselves simultaneously. The thrombotic capillary lesions lead to the focal areas of hemorrhage or perivascular necrosis, probably depending on the severity and speed of the process, and the varying degree of endothelial proliferation produces a disappearance of cortical

ganglion cells, usually of a patchy nature.

The presence of a high concentration of lead in the tissues of this case is of interest. It is doubtful, however, whether lead could produce the acute clinical and pathologic picture described here. Such a morbid process in an adult exposed to lead over a period of years has not been recorded in the literature. The administration of large quantities of sulfamethylthiazole, and the accumulation of this drug in the blood and tissues—owing, in part, to renal failure and closely associated with acutely developing signs of severe neurologic damage—are suggestive evidence that sulfamethylthiazole was the etiologic factor in the pathogenesis of the disorder in this patient.

SUMMARY

A fatal case of hemorrhagic encephalopathy is recorded, which occurred after the oral administration of sulfamethylthiazole. The pathological findings of greatest importance were focal peri-

vascular hemorrhages confined to the gray matter of the cerebral hemispheres and the nuclear structures of the brain stem. Focal perivascular areas of necrosis occurred, apparently simultaneously with the diapedetic hemorrhages. Profound alterations were noted in the small blood vessels, chiefly of the endothelium. Not infrequently these changes occluded the vessel. There was also severe, anoxic neuronal damage.

REFERENCES

1. Courville, C. B. *Pathology of the Central Nervous System*. 344 pp. Mountain View, California: Pacific Press Publishing Co., 1937. Pp. 241-247.
2. Alpers, B. J. So-called "brain purpura" or "hemorrhagic encephalitis": a clinicopathologic study. *Arch. Neurol. & Psychiat.* 20:497-523, 1928.
3. Russell, D. S. Changes in the central nervous system following arsenamine medication. *J. Path. & Bact.* 45:357-366, 1937.
4. Glaser, M. A., Imerman, C. P. and Imerman, S. W. So-called hemorrhagic encephalitis and myelitis secondary to intravenous arsenamines. *Am. J. M. Sc.* 189:64-79, 1935.
5. Alexander, L. and Putnam, T. J. Pathological alterations of cerebral vascular patterns. *A. Research Nerv. & Ment. Dis., Proc.* 18:471-543, 1938.
6. Roseman, E. and Aring, C. D. Encephalopathy following neoarsphenamine. *New Eng. J. Med.* (in press).
7. Putnam, T. J. and Alexander, L. Tissue damage resulting from disease of cerebral blood vessels. *A. Research Nerv. & Ment. Dis., Proc.* 18:544-567, 1938.

MEDICAL PROGRESS

THE VITAMINS*

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THE current literature on the vitamins continues to be voluminous. While remarkable progress is being made by biochemists in recognizing, identifying and finally isolating the various accessory food factors necessary for the health of animals, clinicians are equally industrious in applying the results of this work to the relief of human ailments. There can be no doubt that certain of the newly synthesized vitamins represent a very significant addition to the therapeutic armamentarium of the physician, but the medicinal value of some remains problematical. This is particularly true of those vitamins that have not yet been shown to be necessary for human health but are nevertheless recommended in the treatment of diseases in which there is at present no evidence to suggest a nutritional disorder.

In the following review, no attempt has been made to consider the greater part of the recent literature on the vitamins. Its scope is limited to contributions that are perhaps worthiest of the immediate attention of physicians.

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VITAMIN A

Although vitamin A deficiency undoubtedly results in night blindness, there are still numerous difficulties involved in the use of dark-adaptation tests for the routine diagnosis of vitamin A subnutrition. Even though the technical problem of correctly measuring dark adaptation appears to have reached a satisfactory solution, there are still difficulties in interpreting the results obtained.¹ Poor dark adaptation is sometimes found in subjects with apparently adequate vitamin A intake; furthermore, the administration of vitamin A is not always immediately effective in the relief of partial night blindness. An explanation of such discrepancies is perhaps to be found in the recent report² of a study of experimental vitamin A deficiency. This study showed that although a rise in both rod and cone threshold is regularly obtained on a vitamin A deficient diet, there is nevertheless considerable individual variation in the length of time necessary to produce this change. Furthermore, when once impaired dark adaptation is established, it requires a variable but usually considerable time—often months—to restore the condition to normal by vitamin A therapy. The problem is further discussed in a paper³ that de-

scribes the occurrence of dermatitis characteristic of vitamin A deficiency in children living under poor economic circumstances in New York City. This study has an extensive bibliography, which should be found useful for those interested in vitamin A deficiency, and in the still unsolved problem of its incidence in the general population.

Methods for estimating vitamin A and carotene in blood are now available, but it is too early to say definitely whether they will eventually be useful for routine diagnostic purposes.

VITAMIN B COMPLEX

Thiamin

A most significant contribution to the study of deficiency disease in man is found in the results of experimentally induced thiamin⁴ and vitamin B complex^{5,6} deficiency reported during the year by two independent groups of workers. Hitherto, the only criterion for judging the clinical consequences resulting from deficiency of a given component of the vitamin B complex has been the therapeutic test of administering this component to clinical cases of deficiency disease and observing the extent of the therapeutic response. Such tests are frequently difficult to interpret, since despite the most careful precautions, some of the observed response may be due to nursing care (in pellagrous dermatitis), bed rest (in beriberi heart disease), or even other factors in the diet. The experimental production of such deficiencies under carefully controlled conditions is therefore a most valuable step in helping to define clearly the specific clinical features that result from lack of individual dietary factors.

The study⁴ of induced thiamin deficiency was carried out on 4 female subjects who were fed a basal diet, extremely low in thiamin, but supplemented with adequate amounts of other vitamins. Two other subjects served as controls, and received in addition to the diet varying amounts of synthetic thiamin chloride. The diet was continued for eighty-eight days, after which it had to be terminated owing to uncontrollable nausea and vomiting. The symptoms of which the experimental subjects complained included: fatigue, lassitude, backache, insomnia, muscular weakness and tenderness, extreme anorexia, nausea, vomiting, constipation, loss of weight, palpitation, dizziness, dyspnea and precordial distress. The objective manifestations of the deficiency included: a fall in work capacity, low blood pressure, faint heart sounds and bradycardia at rest, with tachycardia and sinus arrhythmia on exertion. Laboratory investigations showed electrocardiographic changes, —decrease in amplitude with occasional inverted

T waves,—sugar curves of diabetic type, and an increase in the concentration of lactic acid and bisulfite-binding substances in the blood, particularly after exercise. None of the subjects developed edema, cheilosis, glossitis, dermatitis or anemia. There was no fall in serum proteins, and the heart size remained normal throughout. In 2 cases there was absolutely no evidence of peripheral nerve changes; of the others, one developed depressed tendon reflexes, and the other paresthesias of the feet, but apparently only late in the deficiency when vomiting was severe and the absorption of other dietary factors besides thiamin probably reduced in consequence. The foregoing abnormalities, without exception, were completely cured by the administration of synthetic thiamin hydrochloride, while the diet was continued unchanged.

In the other study,^{5,6} use was made of a somewhat different procedure. A female volunteer subject was fed a diet that was deficient in the entire vitamin B complex. The diet was continued for nine weeks, after which thiamin, then riboflavin and finally whole yeast were successively added to the diet, and the improvement due to each observed. The abnormalities noted included almost all those observed in the study previously mentioned, but in addition the subject developed edema,—without, however, any alteration in serum-protein concentration,—macrocytic anemia and x-ray evidence of disturbed gastrointestinal motility, as shown by increased caliber in the loops of the jejunum and delay in the passage of the meal. Synthetic thiamin hydrochloride completely relieved the dyspnea, precordial distress, variable pulse rate, nausea, vomiting and muscle and nerve tenderness. Certain manifestations were only partly or temporarily relieved by thiamin, including anorexia, weight loss, extreme fatigue, loss of memory and inability to concentrate. The anemia, edema and gastrointestinal disturbance were uninfluenced by thiamin or riboflavin but responded to the administration of whole yeast. As in the former study, there was evidence of a disturbance of carbohydrate metabolism, as shown by a diabetic type of sugar curve, which, however, was restored to normal not by thiamin but by whole yeast. The ingestion of glucose was also accompanied by a rise in blood lactic and pyruvic acids; this abnormality was corrected by thiamin alone. The only changes that might be interpreted as evidence of early polyneuritis were a decrease in electrical irritability, muscle and nerve tenderness and unilateral facial hypesthesia.

One striking feature of both studies is the absence of any clear evidence of polyneuritis resulting from deficiency of thiamin. This is in agree-

ment with the conclusions reached from a recent study⁷ of the literature. As this study shows, the belief that thiamin lack results in polyneuritis is founded on a misconception. The only certain consequence of this deficiency is a disturbance of carbohydrate metabolism, resulting in the accumulation of lactic and pyruvic acids in the tissues. This disturbance in animals causes certain neurologic signs, and in man, muscular pain and weakness. The relief of these changes by the administration of thiamin has given rise to the erroneous belief that thiamin will cure nutritional polyneuritis, which frequently coexists but is due to another, probably multiple, deficiency. In view of this and of the foregoing evidence it appears that thiamin should no longer be referred to as the antineuritic vitamin. It is of interest that recent experiments⁸ on pigs have produced extensive degenerative changes in both the central and peripheral nervous systems by feeding a diet adequate in thiamin, riboflavin and nicotinic acid but lacking some unknown factor or factors present in yeast and liver.

Another interesting feature of the foregoing experimental studies is the clear demonstration of the disturbance of carbohydrate metabolism that results from thiamin deficiency, as evidenced by changes in the blood levels of sugar and lactic and pyruvic acids, detectable under suitable conditions. This change in metabolism is presumably responsible for at least the greater part of the clinical findings in these subjects; and as might be expected, they are not easily distinguished from those resulting from any other influence affecting adversely the normal, healthy, biochemical processes of the body. The clinical picture is that of general ill health, both physical and mental. From a practical point of view it is clearly difficult to distinguish thiamin deficiency, except perhaps in its extreme forms, on clinical grounds alone. For this reason there is a definite need for some reliable laboratory test for this deficiency. The estimation in blood of thiamin and of its pyrophosphate cocarboxylase has been accomplished,⁹ but the available methods are too elaborate for routine clinical use, and furthermore, since low values have been obtained in a curious variety of clinical conditions, it is difficult at the present time to assess the significance of such values in terms of actual lack of thiamin. It is now a relatively simple matter to estimate thiamin in urine; but here again there are difficulties in the practical interpretation of the values so obtained. Apparently the excretion of thiamin "varies so rapidly with the intake that it reflects to a large extent the diet during the day or two

preceding the time of urinary excretion."¹⁰ A low excretion level is therefore not necessarily indicative of inadequate nutrition in regard to this vitamin. It is possible, however, that some procedure based on a test-dose method may ultimately yield results of practical diagnostic value.

Riboflavin

One important advance in nutritional therapy has been the report by two independent groups of workers of the relief by riboflavin of a certain disorder of the eyes. It had been reported¹¹ that rats fed on a diet deficient in riboflavin developed an unusual vascularization of the cornea, which was relieved by the administration of this vitamin. However, no similar lesion in man had been attributed to nutritional deficiency until the report,¹² published during the last year, that vascularization of the cornea occurs in malnourished subjects in the South, and that riboflavin is usually effective in its relief. Shortly afterward it was reported¹³ that the lesion formerly known as acne rosacea keratitis usually responded to treatment with riboflavin. This is of particular interest, since acne rosacea has long been suspected of being a manifestation of nutritional deficiency. However, the associated skin lesions usually respond less well to the administration of pure riboflavin. In its severest form the full ocular syndrome attributed to riboflavin deficiency includes: circumcorneal injection, vascularization of the cornea, corneal ulceration and opacities, dim vision, photophobia, mydriasis, iritis and pigmentation of the iris. The explanation of these manifestations is apparently to be found in the peculiar characteristics of the cornea, which, lacking any vascular supply, is unusually dependent for its normal metabolism on the activity of Warburg's "yellow enzyme," an important respiratory enzyme of which riboflavin is an essential constituent. Furthermore, since riboflavin may be inactivated by light, the constant exposure of the cornea may render it peculiarly susceptible to depletion of the yellow enzyme unless a new supply of riboflavin is constantly provided by the diet. It has not as yet been adequately demonstrated how frequently the foregoing syndrome may arise from causes other than riboflavin deficiency, and the fact that it is frequently curable with synthetic riboflavin does not imply that this is the most economical and effective form of treatment. Extracts of yeast or liver are rich in riboflavin and very much cheaper than the synthetic material. Moreover, they may be more therapeutically effective, since they supply other factors that have curative value for associated deficiencies.

As mentioned in last year's review¹⁴ the clinical

manifestations of angular stomatitis and cheilosis, although undoubtedly curable by riboflavin in certain cases, are more likely to be a general manifestation of poor nutrition, however caused. In support of this view is the report¹⁶ that cheilosis has been relieved by the administration of pyridoxin (vitamin B₆).

Other Components of the Vitamin B Complex

Two new components of the vitamin B complex have now passed the stage of chemical identification and synthesis, namely pyridoxin (vitamin B₆) and pantothenic acid (filtrate factor). These vitamins have been recognized and identified by the fact that they are necessary for the maintenance of health in animals. The peculiar situation has arisen that they are now available for clinical trial in synthetic form before it is known whether they are necessary for normal health in man. Already there are reports that pyridoxin is valuable in the relief of epilepsy, muscular dystrophy, Parkinsonism and certain symptoms of pellagra, but in my opinion such reports should be treated with circumspection until further evidence is forthcoming. An initial trial of pyridoxin in cases of nutritional deficiency was disappointing,¹⁰ and at present there appears to be no definite evidence that pantothenic acid is a necessary constituent of the human diet.

ASCORBIC ACID (VITAMIN C)

As with thiamin, so with ascorbic acid, a very material advance has been achieved in the past year by the publication¹⁷ of a careful study of experimentally induced human ascorbic acid deficiency. As a result of this study a number of traditional beliefs regarding clinical scurvy require some revision. A young male adult placed himself on a diet lacking in vitamin C, supplemented with other known vitamins, for a period of six months. The first interesting feature was the remarkably long latent period required before any hemorrhagic manifestations developed; perifollicular hemorrhages were first observed after the diet had been taken for one hundred and sixty-one days. This is considerably longer than the time that was formerly thought to be necessary for the induction of scurvy, and gives rise to the suspicion that in clinical scurvy, as ordinarily observed, other deficiencies may contribute to hasten and exaggerate the effects of ascorbic acid deprivation. The earliest clinical evidence of the deficiency was the appearance over the lower extremities of hyperkeratotic papules containing ingrown hairs. Such papules have been previously observed in scurvy, but hitherto they have usually been regarded as evidence of coexisting vita-

min A deficiency. It is therefore a matter of some interest that they can result from ascorbic acid deficiency alone. The level of ascorbic acid in the blood plasma fell to zero early in the experiment, yet following this, thirteen weeks elapsed before any signs of scurvy developed. This provides further evidence that the estimation of ascorbic acid in plasma gives little information about the presence or imminence of clinical scurvy. However, this study confirmed the reported diagnostic value of estimating the level of ascorbic acid in the platelet-white-cell layer of centrifuged blood.¹⁸ This level did not fall to zero until shortly before the onset of hemorrhagic manifestations. It was of further interest that no anemia developed in the course of the deficiency, in spite of considerable blood loss through venesection. This is in agreement with recent observations,¹⁹ which indicate that the anemia often associated with clinical scurvy may be due to some deficiency other than that of vitamin C. Another negative finding was the absence of changes in the gums, perhaps because of pre-existing good oral hygiene. Two surgical wounds were made during the course of the experiment. The first—after the deficient diet had been taken for three months—healed normally, despite the fact that the level of ascorbic acid in the plasma had been zero for forty-four days. The second wound, made at the end of six months, failed to heal until ascorbic acid was administered. These results suggest that defective wound healing on the basis of ascorbic acid deficiency is unlikely to occur except when the deficiency is severe.

VITAMIN E

Vitamin E is another vitamin that is now available in purified form (synthetic alpha-tocopherol) before it is known for certain whether it is essential for normal nutrition in man. It is certainly necessary for certain animals in which its deficiency produces a degeneration of the spinal cord and associated muscular atrophy. In view of this it has been recommended in the treatment of amyotrophic lateral sclerosis in man, but the initial results of its use in human neuromuscular disorders appear to be disappointing.²⁰

VITAMIN K

The first clinical reports of the value of vitamin K, discussed in last year's review,¹⁴ have been amply confirmed by numerous publications in the last twelve months. The literature is now so extensive that it is beyond the scope of a short review of this kind. For recent summaries, the reader is referred elsewhere.^{21, 22} The beneficial

results of vitamin K administration in hemorrhagic disease of the newborn²³ and in hypoprothrombinemia associated with diseases of the biliary tract,²⁴ especially when surgery is contemplated,²⁵ have been further emphasized. It has been pointed out that a grave prognosis is to be expected when vitamin K administration fails to raise the blood prothrombin concentration in cases of liver disease with hypoprothrombinemia.²⁶

A method has been published²⁷ whereby stable thromboplastin may be prepared, and when this material becomes generally available, Quick's prothrombin test should become a routine procedure in every clinical laboratory. Despite reports of simpler methods for estimating prothrombin concentration, this test continues to be the most reliable for clinical purposes. Another practical achievement has been the production of a water-soluble form of synthetic vitamin K that can be administered parenterally. This is particularly valuable when a rapid response is desirable, as in surgical cases of obstructive jaundice with hemorrhage.

REFERENCES

1. Editorial. Night blindness and vitamin A. *Brit. M. J.* 1:20, 1940.
2. Hecht, S. and Mandelbaum, J. Dark adaptation and experimental human vitamin A deficiency. *Am. J. Physiol.* 130:651-664, 1940.
3. Lehman, E. and Rapaport, H. G. Cutaneous manifestations of vitamin A deficiency in children. *J. A. M. A.* 114:386-393, 1940.
4. Williams, R. D., Mason, H. L., Wilder, R. M. and Smith, B. F. Observations on induced thiamine (vitamin B₁) deficiency in man. *Arch. Int. Med.* 66:785-799, 1940.
5. Elsom, K. O'S., Lukens, F. D. W., Montgomery, E. H. and Jonas, L. Metabolic disturbances in experimental vitamin B deficiency. *J. Clin. Investigation* 19:153-161, 1940.
6. Elsom, K. O'S., Lewy, F. H. and Heublein, G. W. Clinical studies of experimental human vitamin B complex deficiency. *Am. J. M. Sc.* 200:757-764, 1940.
7. Meiklejohn, A. P. Is thiamin the antineuritic vitamin? *New Eng. J. Med.* 223:265-273, 1940.
8. Wintrobe, M. M., Miller, J. L., Jr. and Lisco, H. The relation of diet to the occurrence of ataxia and degeneration in the nervous system of pigs. *Bull. Johns Hopkins Hosp.* 67:377-404, 1940.
9. Goodhart, R. and Sinclair, H. M. Deficiency of vitamin B₁ in man as determined by the blood cocarboxylase. *J. Biol. Chem.* 132:41-51, 1940.
10. Wang, Y. L. and Yudkin, J. Assessment of the level of nutrition. Urinary excretion of aneurin at varying levels of intake. *Biochem. J.* 34:343-352, 1940.
11. Bessey, O. A. and Wolbach, S. B. Vascularization of the cornea of the rat in riboflavin deficiency, with a note on corneal vascularization in vitamin A deficiency. *J. Exper. Med.* 69:1-12, 1939.
12. Sydenstricker, V. P., Sebrell, W. H., Cleckley, H. M. and Kruse, H. D. The ocular manifestations of ariboflavinosis. *J. A. M. A.* 114:243-2445, 1940.
13. Johnson, L. V. and Eckhardt, R. E. Rosacea keratitis and conditions with vascularization of the cornea treated with riboflavin. *Arch. Ophthalm.* 23:899-907, 1940.
14. Meiklejohn, A. P. The vitamins. *New Eng. J. Med.* 222:313-318, 1940.
15. Smith, S. G. and Martin, D. W. Cheilosis successfully treated with synthetic vitamin B₁₂. *Proc. Soc. Exper. Biol. & Med.* 43:640-653, 1940.
16. Kark, R., Lozner, E. L. and Meiklejohn, A. P. Negative effect of synthetic vitamin B₁₂ hydrochloride in nutritional deficiency in man. *Proc. Soc. Exper. Biol. & Med.* 43:97-99, 1940.
17. Crandon, J. H., Lund, C. C. and Dill, D. B. Experimental human scurvy. *New Eng. J. Med.* 223:353-369, 1940.
18. Butler, A. M. and Cushman, M. Distribution of ascorbic acid in the blood and its nutritional significance. *J. Clin. Investigation* 19:459-467, 1940.
19. Lozner, E. L. Studies of hemoglobin regeneration in patients with vitamin C deficiency. *New Eng. J. Med.* 224:265-268, 1941.
20. Sheldon, C. H., Butt, H. R. and Woltman, H. W. Vitamin E (synthetic alpha-tocopherol) therapy in certain neurologic disorders. *Proc. Staff Meet., Mayo Clin.* 15:577-580, 1940.
21. Stewart, J. D. Clinical and experimental evidence on the nutritional requirements in obstructive jaundice. *New Eng. J. Med.* 223:1053-1056, 1940.
22. Brinkhous, K. M. Plasma prothrombin: vitamin K. *Medicine* 19:32-416, 1940.
23. Poncher, H. G. and Kato, K. Treatment of hypoprothrombinemia haemorrhagica neonatorum (hemorrhagic disease of the newborn) with vitamin K. *J. A. M. A.* 115:14-17, 1940.
24. Pohle, F. J. and Stewart, J. K. Observations on the plasma prothrombin and the effects of vitamin K in patients with liver and biliary tract disease. *J. Clin. Investigation* 19:365-372, 1940.
25. Butt, H. R. The preoperative and postoperative use of vitamin K in cases of deficiency of prothrombin. *S. Clin. North America* 20:1203-1210, 1940.
26. Kark, R. and Souter, A. W. Synthetic vitamin K in the treatment of hypoprothrombinemia. *Lancet* 1:1149-1153, 1940.
27. Souter, A. W. and Kark, R. Quick's prothrombin test: simplified by the use of stable thromboplastin. *Am. J. M. Sc.* 200:603-607, 1940.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27101

PRESENTATION OF CASE

A fifty-four-year-old woman entered the hospital complaining of vaginal bleeding.

The patient was first seen in the Out-Patient Department four years before admission, at which time she stated that although her periods were regular there was an increase in menstrual flow and a lengthening of its duration from five to ten days, with accompanying hot flashes. A dilatation and curettage was performed and showed normal endometrium in the early secretory phase. During the next year her periods were normal, but the hot flashes continued. Two years before admission menorrhagia again appeared, and the periods lengthened to ten days, although they were still regular. In addition, the patient suffered from morning nausea, — occasionally with vomiting, — frequent headaches, insomnia and nervousness. There had been no weight loss, and physical examination was negative. These symptoms lasted for a year and a half, when menstruation ceased for three months, but at the end of this time an excessive flow occurred, lasting for one month. This was followed a month later by an apparently normal period, and then amenorrhea with disappearance of the hot flashes and other symptoms. No further bleeding occurred until one month before admission, when the patient noticed a slight spotting and found it necessary to use one pad daily. She noticed also that the same sensation arose in her breasts that she was accustomed to associate with menstruation. Nine days before admission the flow suddenly increased to a point necessitating twelve pads daily. The patient said that "the blood seemed to gush out." This was accompanied by anorexia and intermittent crampy lower abdominal pain aggravated by standing and walking. These symptoms abated somewhat two days before admission. The patient stated that she had lost 5 pounds in nine days. She had had seven pregnancies — five children and two miscarriages.

The family history was irrelevant. The patient had had a dilatation and curettage after her second miscarriage twenty-three years before admission.

On examination the patient was well developed and well nourished and in no distress. Examination

of the heart and lungs was negative; the blood pressure was 125 systolic, 90 diastolic. The abdomen was found to be tender in its entire lower portion, most marked in the right lower quadrant, but no masses could be felt. On pelvic examination, hemorrhoids were present and the perineum was relaxed. The cervix was small, soft and non-tender, and showed a well-healed laceration and a bloody discharge. One examiner believed that there was definite resistance to palpation in the left vault, with a clear right vault. The fundus was slightly enlarged, but in normal position. Examination of the nervous system was negative.

The temperature, pulse and respirations were normal.

Examination of the urine was negative. Examination of the blood showed a red-cell count of 4,000,000 with a hemoglobin of 68 per cent, and a white-cell count of 10,100. A blood Hinton reaction was negative. Culture of the cervix was negative for beta hemolytic streptococci.

On the second hospital day an examination under ether anesthesia revealed the fundus to be about twice normal size, but freely movable; the vaults were clear. An operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. JUDSON A. SMITH: The history of this bleeding is a little confusing. The story begins four years before admission, and appears to be only the history of a woman with some menorrhagia and the symptoms of the menopause. I think we can ignore that part of the history. Two years before admission, the menorrhagia again appeared and the periods lengthened, a condition that lasted a year and a half, which brings this story up to six months before admission. That also does not seem to have any bearing on the present condition. Let us start there and note that six months before admission the patient missed a period for the first time except for her pregnancies. She missed three periods, and after that had a month of fairly profuse bleeding, but we are not told whether she had cramps or signs of abortion. A month later she had what was apparently a normal period. It is important to consider that it might not have been a normal period but a spell of bleeding that passed for a period. Then she had amenorrhea for an indefinite period, which could not have been long. If we knew how long, it might be of some help in figuring out this case. Finally, she was admitted with a story of profuse bleeding for the nine days preceding admission.

When she was examined, the only positive finding was tenderness in the lower abdomen and enlargement of the uterus, with a soft cervix from

which there was a bloody discharge. It is impossible to make a diagnosis on a case like this without a curettage. There are two essential procedures: one is the examination under anesthesia, which was done and which presumably showed only that the uterus was twice normal size. I suppose that we can presume that it was smooth and normal in shape and not softer or harder than the ordinary uterus. The other essential procedure is a curettage.

If we try to make a diagnosis without the results of curettage, I think the reasoning goes like this: There are three categories, into one of which this case must fall: functional bleeding, neoplasm and some complication of pregnancy. Let us take functional bleeding first. The diagnosis of functional bleeding can be made only after other diagnoses have been excluded by curettage. However, the enlarged uterus and the crampy pain with tenderness do not fit well with functional bleeding. In addition, no one felt a mass that could be a tumor or cyst of the ovary. When we come to the question of neoplasm, we have to consider in any patient bleeding at this age the possibility of cancer of the fundus, which can be excluded only by diagnostic curettage. I get the impression from the story, however, that the bleeding was more acute and profuse than one would naturally associate with cancer of the fundus. So far as bleeding from fibroids is concerned, we have the fact that under ether no one felt them in the uterus; if the patient had them, they must have been submucosal. We are left with the possible complications of pregnancy, among which there is also neoplasm, of course, namely, a chorion-epithelioma.

One can construct two or three plausible hypotheses to explain this bleeding, starting with the assumption that the patient was pregnant. In the first place, if she had been admitted to the hospital and nothing had been known about the past history, nine days of profuse bleeding, crampy lower abdominal pain and a uterus twice normal size would suggest that she was in the process of aborting. For obvious reasons, that does not seem impossible in this case, even though the patient is fifty-four years old. We could then explain the rest of the history, of course, by saying that the previous amenorrhea was the onset of the menopause, or we might go back farther and suppose that she became pregnant at the time the amenorrhea started, skipped three periods, had a blighted ovum, and then had a month's flowing and aborted herself without realizing that she had been pregnant. In that case she might be bleeding now because of retained products of conception, from what we call a placental polyp or from a chorion-epithelioma. If that were so, she ought to have

a strongly positive Aschheim-Zondek reaction. Is there a report of an Aschheim-Zondek test?

DR. TRACY B. MALLORY: None was done.

DR. SMITH: I suspect that the examiners did not consider the possibility that the patient was pregnant, and perhaps she was not. The third hypothesis, which is perhaps the most attractive of all, is what is called a "missed abortion." Because the patient was menstruating regularly, we assume that she was still fertile, that she became pregnant, and that the fetus died without any signs of abortion. Then later she bled profusely, possibly had cramps but still did not abort; she went on another month, had another spell of bleeding, loss of appetite, loss of weight, a large uterus and crampy lower abdominal pain. That would, I think, perfectly explain everything, and to my mind is the most plausible diagnosis, although without a curettage, it is more a guess than a diagnosis.

CLINICAL DIAGNOSIS

Functional bleeding?

Carcinoma of the fundus?

DR. SMITH'S DIAGNOSIS

Missed abortion.

ANATOMIC DIAGNOSES

Follicular cyst of ovary.

Proliferative endometrium.

"Functional bleeding."

PATHOLOGICAL DISCUSSION

DR. MALLORY: After the ether examination, the house staff proceeded with a diagnostic curettage. This showed a grossly normal endometrium, and frozen sections likewise showed no histologic evidence of cancer. For reasons that were not anatomically apparent, the surgeon decided to perform a complete hysterectomy; we consequently had the opportunity to examine the uterus and ovaries in detail, and they were all absolutely negative except for a follicular cyst in one ovary, so that this case must be classified as functional bleeding at the menopause, and we can safely rule out anything else.

DR. GEORGE A. MARKS: Was there proliferative or hyperplastic endometrium?

DR. MALLORY: There was a proliferative endometrium, with an occasional dilated gland, but the whole thickness of endometrium was barely over a millimeter, so that we could hardly call it hyperplastic.

DR. JOE V. MEIGS: The follicular cyst is characteristic. If the patient had an ovarian cyst and amenorrhea, followed by bleeding, she probably had metropathia hemorrhagica, a condition that I should have thought of first, not being an obstetrician.

CASE 27102

PRESENTATION OF CASE

A sixty-three-year-old Italian housewife entered the hospital complaining of vaginal bleeding.

The patient's menopause occurred at the age of forty, and she had had no bleeding since that time, until five weeks before admission when, during urination, she noticed a few drops of blood, which appeared to be coming from her vagina. This occurred on two other occasions, but at no time were her clothes stained. Two days before admission, while at stool, about "a quarter of a wine glass" of blood escaped from her vagina. The patient had not lost weight, nor had she noticed any blood in her stools, change in bowel habits, pain or urinary symptoms. She had had twelve children and three abortions.

For the previous twenty-five years the patient had been treated for diabetes mellitus without insulin, and for a little more than a year she had been treated in this hospital for arteriosclerotic heart disease with hypertension and paroxysmal tachycardia. The family history was irrelevant.

On examination the patient was well developed, obese and in no apparent discomfort. The heart was slightly enlarged to percussion, and a loud high-pitched systolic murmur could be heard in the aortic area, which was transmitted into the neck vessels. The rhythm was regular, the aortic second sound greater than the pulmonary second, the blood pressure 150 systolic, 80 diastolic. Examination of the lungs revealed moist rales at each base posteriorly. Examination of the abdomen and extremities was negative. On vaginal examination the perineum was relaxed, with a moderate cystocele and rectocele. There was a slight reddening of the urethral orifice. On the posterolateral wall of the vagina there was a firm 0.5-cm. nodule, the color of which blended with that of the mucosa. Another 0.3-cm. nodule was present on the anterior wall in front of the cervix. The cervix was of normal size, smooth and freely movable. The vaults were clear; the fundus could not be felt.

The temperature, pulse and respirations were normal.

Examination of the urine was negative. Examination of the blood showed a red-cell count of 3,980,000 with a hemoglobin of 80 per cent, and a white-cell count of 8400. A blood Hinton reaction was negative.

On the fourth hospital day an operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. WARD L. GREGG: Apparently this was a mild diabetic patient with arteriosclerotic heart disease

not completely compensated, who gave a short story of intermittent, painless mild postmenopausal bleeding. The chief probable causes for painless postmenopausal bleeding twenty-three years after the cessation of the last period are: carcinoma of the fundus, atrophic vaginitis, carcinoma of the cervix, cervical polyps, uterine polyps, carcinoma of the tube and neoplasm of the ovary, such as granulosa-cell tumor. One must also consider idiopathic fundal or cervical bleeding, so-called "uterine apoplexy," probably owing to some vascular breakdown in the cervix or uterus, not connected with any recognizable disease entity in the genital tract. Moreover, a calcified submucous or intramural fibroid can bleed before or after the menopause as the result of breakdown of the tissue owing to pressure. Finally, a neoplastic lesion primary in the vagina itself is possible.

This obese woman was apparently not anemic and showed no weight loss, which would rule out any very extensive process. Vaginal examination showed a relaxed pelvic floor, with cystocele and rectocele, which is not surprising after so many pregnancies. It is not remarkable for even a mild diabetic patient to have a reddened urethral orifice. There is no mention of vaginal reddening to suggest an atrophic vaginitis with secondary fundal infection, which is rather uncommon but oftener seen in diabetes. There are described, however, two small, firm discrete nodules in the vaginal mucosa without discoloration of the overlying mucous membrane or evidence of recent ulceration that might cause bleeding. Since there is no ulceration, I am going to assume that the bleeding did not come from the nodules, but that they might well have represented metastases. The cervix was normal in size, smoothness and mobility, and no cervical polyps or erosion was described. The fundus could not be palpated because of obesity. There is no mention of a Clark test; this consists in the passage of a uterine sound through the cervix, a procedure which, if a friable lesion is present in the uterus, produces bright bleeding on withdrawal of the sound.

Calcified myomas are rarely seen and easily diagnosed with either curettage or the passage of a uterine sound. Neither carcinoma of the tube or ovary, uterine polyp, idiopathic bleeding nor atrophic vaginitis could account for the vaginal nodules if we assume that they were metastatic in origin. It is conceivable that carcinoma of the tube or ovary could produce metastases in the vagina, but this would be rather rare—less than 0.5 per cent. The usual channels from tube and ovary are to the peritoneum, pleura, lung, heart, spleen and bone, in more or less that order. Another thing that points against carcinoma of the

the problems of cause and effect that these most prevalent and disabling diseases present to both clinicians and research workers. One hundred and thirty physicians are members of this council.

The report details the work of the council from November, 1939, to November, 1940. No one can read this stimulating brochure dealing with "The Defence Forces," "Research," "Administration" and "The Future" without agreeing with the statement, "During twelve months of resistance to the Nazi attempt to plunge the world again into a Dark Age, the full brunt of which has fallen on these islands, the decision of 1939, that our council should carry on with its work, has been justified."

In the face of great difficulties and grave dangers the research projects that had already been undertaken were continued until almost the close of the year. One of the laboratories was hit by a bomb and the building seriously damaged. Special hospitals for the treatment of rheumatic diseases are being planned for the army, since the very considerable incidence of these diseases among the soldiers in World War I is likely to be still greater because the conditions of service in highly mechanized warfare make soldiers more susceptible to them. Lord Horder has accepted the chairmanship of the Medical Advisory Committee of the Ministry of Labor and of the Committee of Inquiry Regarding Health Conditions in Air-Raid Shelters, and the council is thus in close touch with these key positions in relation to the war on rheumatic diseases. The receipts and payments of the council account to October 31, 1940, seem to show a favorable balance of over £6000.

In time of peace the Empire Rheumatism Council prepared for war and for the control of a group of chronic diseases that they knew would follow. Now in war they are striving to lessen the load of disability that must be carried long after peace is declared, by attacking these chronic diseases as soon as the early signs appear.

This outstanding effort should stir our country to do likewise. The American Rheumatism Association has appointed a committee to deal with

the problems of military defense. This committee has offered its services to the proper officials of the United States Army and to various committees of physicians concerned with national defense, in relation to the organization of special courses in the treatment of arthritis and to making personnel available. It is hoped that such services will eventually be accepted, for in times of even possible war it is surely not too early to prepare for one of the greatest problems that peace presents. In this regard, it is well to note the last paragraph of Lord Horder's report:

We can, I feel, look back on the work of the past four years—work tragically hindered by war and preparations for war—with some satisfaction. Research into causative factors has progressed. Clinical research into methods of treatment has made notable advances. We are far better equipped than we were in 1936 to advise the community as to how the ravages of rheumatic diseases can be checked at once, and have made distinct advance towards the objective of effective control. Such effective control, when it comes to be realized, will remove from humanity one of its greatest afflictions, bringing us nearer to understand the vision of Isaiah: "They shall not hurt nor destroy in all my holy mountain, for the earth shall be full of the knowledge of the Lord, as the waters cover the sea."

MEDICAL EPONYM

GROCCO'S TRIANGLE

Pietro Grocco (1857-1916), of Florence, first described his triangle at the fourth session of the twelfth congress of the Società Italiana di Medicina Interna, in October, 1902. An abstract of his remarks appears under the title "Triangolo paravertebrale opposto nella pleurite essudativa [The Paravertebral Triangle on the Side Opposite to Pleurisy with Effusion]" in the transactions of the society: *Lavori dei Congressi di Medicina Interna* (12: 190, 1902). A portion of the translation follows:

Professor Grocco thus designates a new symptom, which he has often found in pleurisy with effusion. It consists in a triangular area of relative dullness on the posterior wall of the thorax opposite the side involved. The internal border of this triangle is represented by the line of the spinous processes, the base by the lower limit of thoracic resonance (which varies somewhat over a space of 3 to 6 cm.), and the external border by a line that extends obliquely upward to the highest point reached by the level of the exudate.

Over this area the impairment of sound is more marked toward the median line and toward the base, and the base line itself varies in length and degree of dullness with different positions of the patient as he lies in bed, and with variations in the amount of fluid. The fluoroscope and radiogram confirm the percussion findings. This is illustrated by the accompanying figure, which shows two radiograms, one taken during life, the other from a cadaver in which one pleural cavity was filled with a solution of lead acetate. The test on the cadaver tends to support the idea that the pleural sac, when full of fluid, extends beyond the median line sufficiently and in such a way as to explain the triangular area of dullness above mentioned.

R W B

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
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RHEUMATIC HEART DISEASE IN PREGNANCY

Mrs. E. G., a twenty-seven-year-old para III at term, entered the hospital on March 28, 1940, complaining of irregular abdominal cramps, shortness of breath and swelling of the ankles.

The family history was noncontributory. At the age of ten the patient had rheumatic fever with involvement of the heart. The tonsils and adenoids were removed at that time. When the patient was sixteen and again when she was twenty, the rheumatic fever recurred with slight heart involvement. There were no signs or symptoms of decompensation. Catamenia began at thirteen, were regular with a twenty-nine day cycle and lasted five days. The last menstrual period began on July 8, 1939, making the expected date of confinement April 15. The first pregnancy ended in a stillbirth following a placenta previa in 1932, the second was a full term normal delivery in 1936. There were no cardiac or other complications during these pregnancies.

The patient was first seen in the prenatal clinic on November 2, 1939, and was instructed to return weekly. She did not exhibit any untoward signs or symptoms obstetrically or medically. Her last visit to the clinic was on February 29, and she was not seen again until she entered the hospital.

Examination at the time of admission revealed cyanosis of the lips, dyspnea to the point of or-

thopnea, and considerable edema of the lower extremities. There was enlargement of the heart to the left and downward, and a presystolic and systolic murmur at the mitral area, with transmission to the axilla. The rate was 125, and the rhythm regular. The blood pressure was 160 systolic, 110 diastolic. The respirations were 26, and there were many fine moist rales at both lung bases. The liver edge was palpable two fingerbreadths below the costal margin. The fundus was four fingerbreadths below the xiphoid, and the fetal heart was audible in the left lower quadrant. Rectal examination showed the cervix thick, not taken up and dilated to admit one finger. A consultation was held with a cardiologist, who reported: "The heart is enlarged to the left, the rhythm regular, the rate increased. There is a double mitral murmur. Mitral stenosis is the dominant lesion. The lungs are moist at both bases. Diagnosis: rheumatic heart disease (double mitral) and beginning decompensation. Recommend digitalization, moderate restriction of fluids, a 1200 calorie diet and $\frac{1}{2}$ gr. morphine sulfate every four or five hours as necessary."

The patient started in active labor at 10 p.m. on March 28, and after labor was well established, she was given 3 gr. Nembutal. Nitrous oxide and oxygen were administered during the second stage and during delivery, which resulted in a living male child.

Obstetrically the patient had an uneventful postpartum course. Following delivery, respiratory distress was slightly relieved, but dyspnea continued while the patient was in a recumbent position. The edema gradually disappeared, and the urinary output increased. Ten days postpartum the moisture at the lower lung field had cleared, and the edema had entirely disappeared. The patient's general condition was greatly improved, and her only complaint was shortness of breath when lying down. She received ammonium chloride and $\frac{1}{2}$ gr. digitalis daily. In view of the improvement and the absence of any signs of cardiac decompensation, the patient was permitted to sit up on April 19, three weeks postpartum. However, almost immediately edema of the extremities reappeared, and absolute bed rest was again necessary. The temperature continued to remain normal, the pulse was regular, and the respirations were normal. The blood pressure ranged from 160 to 140 systolic, and 100 to 60 diastolic. The urinary output again closely paralleled the intake, the edema cleared, and the patient appeared greatly improved. On May 10 she was allowed out of bed, and continued to be ambulatory until her discharge on May 18.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

Comment. This case illustrates that rheumatic heart disease must always be considered a potentially serious complication during pregnancy. Previous pregnancies without decompensation do not necessarily mean that the individual heart is able to carry on successfully in subsequent pregnancies. This patient gave no history of decompensation following the attacks of rheumatic fever or during two previous full-term pregnancies. Furthermore, there was no apparent decompensation until approximately the stage of pregnancy at which the load is supposed to diminish. The patient went through her labor successfully, in spite of existing signs of decompensation. That the heart muscle had been definitely damaged was shown by the history of recurring signs of cardiac failure when the patient was first allowed to get out of bed. This heart should never again be asked to stand the load of pregnancy; if pregnancy should take place, interruption should be considered.

VETERANS' INFORMATION ON DEATH CERTIFICATES

In the June 13, 1940, issue of the *Journal*, attention was called to the failure of many physicians to list on death certificates the status of the deceased as a veteran, as required by Sections 9 and 10 of Chapter 46 of the General Laws.

The standard death certificate has recently been revised by Arthur J. Hassett, registrar of vital statistics. These new certificates are ready for use, and in their present form there is even less excuse for the attending physician to fail in making a complete record.

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning March 9:

BERKSHIRE

Thursday, March 13, at 4:30 p.m., in the Bishop Memorial Building, Pittsfield. Surgery of the Hand. Instructor: Franklin G. Balch, Jr. Harry G. Mellen, *Chairman*.

BRISTOL SOUTH (Fall River Section)

Tuesday, March 11, at 4:30 p.m., at the Union Hospital, Fall River. Diagnosis, Treatment and Prognosis of Central-Nervous-System Syphilis. Instructor: Francis M. Thurmon. Howard P. Sawyer, *Chairman*.

FRANKLIN

Thursday, March 13, at 8:00 p.m., in the Library of the Franklin County Public Hospital, Greenfield. Pediatric Case Discussions. Instructor: Louis K. Diamond. Halbert G. Stetson, *Chairman*.

HAMPDEN

Wednesday, March 12, at 4:00 p.m., at the Academy of Medicine, Professional Building, 20 Maple

Street, Springfield, and at 8:00 p.m., in the Out-patient Department of the Skinner Clinic, Holyoke Hospital, Holyoke. Obstetric Complications with Case Histories and Clinical Problems. Instructor: Meinolf V. Kappius. Alfonso A. Palermo, *Chairman*.

HAMPSHIRE

Thursday, March 13, at 4:15 p.m., in the Nurses' Home of the Cooley Dickinson Hospital, Northampton. Dermatitis and Eczema. Instructor: Bernard Appel. Robert C. Byrne, *Chairman*.

WORCESTER

Tuesday, March 11, at 8:30 p.m., in the Nurses' Home of the Milford Hospital, Milford. The Treatment of Varicose Veins. Instructor: Robert R. Linton. Joseph Ashkins, *Chairman*.

WORCESTER NORTH

Friday, March 14, at 4:30 p.m., in the Nurses' Home of the Burbank Hospital, Fitchburg. Therapeutic Uses of Preparations of Endocrine Glands: Thyroid gland, pituitary gland, ovary, testis and adrenal cortex. Instructor: William T. Salter. George P. Keaveny, *Chairman*.

DEATH

BRIGGS—L. VERNON BRIGGS, M.D., of Boston, died at his winter home at Tucson, Arizona, February 28. He was in his seventy-ninth year.

Born in Boston, he attended Boston Latin and Chauncy Hall schools, passing entrance examinations for Harvard Medical School at the age of fifteen. Although too young to be enrolled at the school he was allowed to attend lectures there. After a voyage around Cape Horn, for his health, he went to Honolulu, where he studied under Dr. John S. McGrew. A year later he returned to this country, studied in San Francisco and also at Tufts College Medical School and Dartmouth Medical School. He finally received his degree from the Medical College of Virginia in 1899, and started the practice of psychiatry in Boston.

Dr. Briggs then became the associate of Dr. Walter Channing at his Brookline sanitarium. He soon opened his own sanitariums, which were the first in the country to admit curable mental patients only. While secretary to the state board of insanity he did much to improve the care of the mentally ill in Massachusetts.

He held fellowships in numerous societies, among which were the Massachusetts Medical Society and the American Medical Association, the American Psychiatric Association and the New England Society for Psychiatry.

His widow and a son survive him.

MISCELLANY

NOTES

Dr. Francis G. Blake, Sterling Professor of Medicine, has been appointed dean of the Yale University School of Medicine.

Dr. William T. Salter, assistant professor of medicine, Harvard Medical School, associate physician, Thorndike Memorial Laboratory, and junior visiting physician, Boston City Hospital, has been appointed professor of pharmacology, Yale University School of Medicine.

Dr Merrill Moore has been appointed to serve as medical director of the Washingtonian Hospital

On January 24, Dr William B. Castle gave the Edward Gamaliel Janeway Lecture at Mount Sinai Hospital, New York City, his subject being "Hemolytic Anemias"

RÉSUMÉ OF COMMUNICABLE DISEASES IN MASSACHUSETTS FOR JANUARY, 1941

DISEASES	JANUARY 1941	JANUARY 1940	FIVE YEAR AVERAGE*
Anterior poliomyelitis	0	2	0
Chicken pox	1574	2328	1924
Diphtheria	9	31	28
Dog bite	524	607	580
Dysentery bacillary	3	35	13
German measles	73	36	96
Gonorrhea	273	342	435
Lobar pneumonia	1052	673	725
Measles	1858	962	1833
Menococcal meningitis	8	7	8
Mumps	836	562	954
Paratyphoid B fever	5	5	1
Scarlet fever	592	565	963
Syphilis	296	421	413
Tuberculosis pulmonary	293	167	260
Tuberculosis other forms	25	21	29
Typhoid fever	4	8	6
Undulant fever	5	2	4
Whooping cough	1076	625	940

*Based on figures for preceding five years

RARE DISEASES

Diphtheria was reported from Boston 1, Chelsea 2, Fall River, 3, Fitchburg 1, Medford, 1, Waltham, 1, total, 9

Dysentery, bacillary, was reported from Danvers, 2, Lynn, 1, total, 3

Infectious encephalitis was reported from Lowell, 1, total, 1

Malaria was reported from Chelsea, 1, total, 1

Meningococcus meningitis was reported from Boston 1, Chicopee 1, Framingham 1, Lenox, 1, Melrose 1, Middleboro 1, Newbury, 1, Taunton, 1, total, 8

Paratyphoid B fever was reported from Boston 2, Lowell 2, Malden, 1, total, 5

Pellagra was reported from Boston, 1, total, 1

Pfeiffer bacillus meningitis was reported from Attleboro 1, Chicopee, 1, total, 2

Septic sore throat was reported from Boston 8, Fall River, 3, Lexington, 1, Lowell, 1, Merrimack, 1, Oxford, 1, Springfield, 1, total, 16

Trachoma was reported from Boston, 1, Everett 1, New Bedford, 1, total, 3

Trichinosis was reported from Southbridge, 1, total, 1

Typhoid fever was reported from Somerville, 1, Springfield 1, Worcester, 2, total, 4

Undulant fever was reported from Athol, 1, Brockton 1, Gloucester, 1, Hudson, 1, Raynham, 1, total, 5

Chicken pox, dog bite, bacillary dysentery, German measles, mumps, scarlet fever and tuberculosis (other forms) were reported below the five year averages

Measles, tuberculosis (pulmonary) and whooping cough were reported above the five year averages

The incidences of meningococcus meningitis and undulant fever were not unusual

Typhoid fever showed low incidence

Diphtheria was reported at a record low figure for January

Lobar pneumonia was reported at the highest figure since the corresponding month in 1929

Paratyphoid B fever reached the record high figure of last January

CORRESPONDENCE

NOTICE TO BOSTON PHYSICIANS

To the Editor In order that physicians of Boston may more readily obtain outfits for the collection of sputum to be sent to the State Bacteriological Laboratory for pneumonia typing, such outfits are now available at any one of the forty-five culture stations throughout the city which are maintained by the City of Boston Health Department for the distribution and collection of its own bacteriological laboratory outfits, as well as for the distribution of all state-supplied biologic products. Any physician using such a pneumonia sputum outfit is responsible for its delivery to the State Bacteriological Laboratory at the State House, Room 527. This added service of the health departments concerned, emphasizes the value of pneumonia typing, particularly when it has been shown that chemotherapy is not the full answer in the treatment of pneumonia, and that physicians should be prepared to give serum therapy if good results with drugs are not obtained promptly.

G. LINDE GATEL, M.D., Health Commissioner,
City of Boston

REPORTS OF MEETINGS

BOSTON ORTHOPEDIC CLUB

A regular meeting of the Boston Orthopedic Club was held at the Boston Medical Library on December 16, 1940 with Dr. Augustus Thorndike, Jr., presiding. The Society was addressed by Dr. Stuart Mudd, professor of bacteriology at the University of Pennsylvania School of Medicine, on "A New Method for the Preparation of Blood for Use in the Treatment of Shock and Allied Conditions."

Dr. Mudd briefly reviewed the history of blood preservation. In discussing the technique of desiccating blood serum or plasma, he stated that solid carbon dioxide was too expensive, that anhydrous calcium sulfate was cheaper, owing to the reversibility of the process, and requires less attention but that the capacity for such a system is too small, and finally that the new vacuum pumps have a larger capacity and are more economical for large scale desiccation.

The speaker then went on to discuss the various uses of blood serum and plasma. One of the first for serum was in the prevention or treatment of specific infectious diseases of children and there are now several large centers scattered throughout the children's hospitals of the country. Placental immune globulin, introduced by McKhann, is now considered effective in decreasing the severity or incidence of complications in measles or in the prevention of this disease in institutions. Pooled convalescent serum has been shown on the average to decrease the incidence of scarlet fever in those exposed to the disease from about 14 to less than 2 per cent. It has also been used with variable results in the therapy of scarlet fever. The serum treatment of mumps, chicken pox and whooping cough is still in the experimental stage, and has not been accepted by the Council on Pharmacy and Chemistry of the American Medical Association but

the statistics appear promising. The treatment of poliomyelitis with convalescent serum in the preparalytic stage is still controversial. Pooled serum taken from young men from congested areas who have been made hyper-immune by injections of Sauer's vaccine has markedly reduced the morbidity and mortality of whooping cough in infants. The early use of convalescent serum in mumps appears advantageous, but it is probably ineffective after the virus has become intracellular, except to prevent involvement of new cells, especially those in the gonads. The results in chicken pox have not been so promising.

Serum and plasma, in concentrated form, may be employed to advantage in decreasing cerebrospinal-fluid pressure in operative cases or those of traumatic concussion. It is both logical and physiologic to use these substances, which contain both protein and electrolytes. The blood pressure rises as the spinal-fluid pressure drops. One hundred cubic centimeters of four-times concentrated serum was shown to decrease the pressure for two days. Dr. Mudd explained that although the increment of body plasma gained from such infusions is only 10 per cent, this may be enough to keep the intravascular osmotic pressure above a critical level. It was pointed out that the water balance of the patient at the time of treatment must be considered in determining how much serum should be given and in what concentration.

The third large group in which serum or plasma therapy is effective is in patients who become poor surgical risks because of hypoproteinemia, as in chronic gastrointestinal conditions. In such circumstances, healing is prone to be poor and wounds may open. Amino acid feeding has also been attempted. The intravenous use of serum or plasma in hypoproteinemia has proved effective.

The final conditions discussed by Dr. Mudd were secondary shock and burns, in which serum or plasma therapy is rapidly becoming the treatment of choice. In closing, the speaker observed that fresh serum or serum preserved in the fresh state may give a skin reaction, but that storage for some weeks in the liquid state seems to prevent this. It was suggested that this may be due to some labile substance involved in the clotting mechanism and preserved by immediate refrigeration. Plasma was considered the most ideal fluid.

The discussion was opened by Dr. Francis T. Hunter, of the Massachusetts General Hospital, who stated that there is no evidence that typing of serum or plasma is not necessary. He said that the suggestion had been made that all plasma might be made universally compatible by absorbing the agglutinins on the unused cells, but that this seemed to make the procedure more difficult rather than simpler than blood transfusion. Concerning the adoption of blood banks and the preservation of fluids, he stated that a centralized authority is necessary to maintain the proper standard, and that the advantages may not justify the expense.

Dr. Stephen J. Maddock, of the Boston City Hospital, remarked that the program is of more benefit to a municipal institution than to endowed hospitals, since in 1940 the outlay for blood transfusions at the Boston City Hospital was two and a half times that at the Massachusetts General Hospital. He added that liquid plasma was considered less expensive and easier to prepare than the dried form.

Dr. Benjamin Alexander, of the Beth Israel Hospital, — where a bank has been used for over a year, — expressed his satisfaction with the results to date. One hundred transfusions of whole plasma were administered without reaction in a period of eight months, during which 500 blood transfusions were given with only a few minor reactions. Dr. Alexander suggested that two types of

plasma be made: one in which all the possible blood constituents are preserved, and the other in which only the protein and electrolytes are saved by less delicate and easier methods. The latter material would be adequate for most cases of shock. He warned that the use of too much dried plasma in certain cases of shock might affect renal function by further increasing the prerenal deviation. The use of these materials has thus far proved ineffective in the nutritional edemas of hepatic cirrhosis.

Dr. Frank Barton, of the Massachusetts Memorial Hospitals, emphasized the importance of separating the liquid plasma before the blood begins to hemolyze. Cultures should be taken to ensure its freedom from contamination, and a specially trained group should do all the work. In his experience the average dose of plasma was 500 cc. Pooled plasma in amounts up to 1000 cc. was used in many cases, without reaction. In regard to cost, Dr. Barton stated that most outpatients are more than willing to donate 500 cc. of blood for \$7.50.

Dr. Joseph Porter, of the Maine General Hospital, stated that after having given 2700 transfusions without a death, there had been 4 in the last 500. Two of these undoubtedly could not be attributed to the plasma. In answer to a question about the feasibility of such a system in relatively small institutions, Dr. Porter stated that there are great advantages in avoiding haste in emergencies and the spasmodic swamping of the hospital with groups of donors. At the Maine General Hospital a complete physical examination of each prospective donor and a blood smear to rule out malaria are now required. Finally Dr. Porter raised the question whether the use of four-times concentrated serum might not lead to more reactions.

The discussion was closed by Dr. Mudd. He said that he did not believe that the adsorption of agglutinins is necessary, for reactions do not occur in practice. This may be owing to the fact that only pooled plasma is used, which may reduce the titer. Furthermore, the agglutinin receptors in the tissue help adsorb these substances. Dr. Mudd stated that although prothrombin and other more specialized elements are not necessary in the treatment of shock, such patients often have infection or some other superimposed condition that these "extras" may benefit. Blood is not a practical fluid for war use, and should be replaced by liquid or preferably dry plasma or serum, for ease of shipment and storage, especially in tropical countries. Dilute rather than concentrated plasma should be used in dehydrated patients in whom fluid is also needed.

GREATER BOSTON MEDICAL SOCIETY

A regular meeting of the Greater Boston Medical Society was held at the Beth Israel Hospital on January 7, with Dr. Aaron Thurman presiding. The speaker of the evening was Dr. Ephraim Shorr, of New York City, who discussed "Recent Advances in Female Endocrinology."

Instead of surveying the whole field Dr. Shorr discussed the vaginal smear as a method of approach to the diagnosis and treatment of certain conditions. It was admitted that it is not the only procedure, or even the best, and that it may not be applicable to every case; it is a clinical rather than a laboratory test, however, and therefore easily carried out. The development of this method from 1917, when vaginal changes were first correlated with the menstrual cycle in animals, to the present was reviewed. Dr. Shorr briefly described his technic of fixing and staining vaginal smears, and showed lantern slides of the changes in the normal cycle as a basis for comparison with abnormal conditions. During menstruation there

are red cells, white cells, mucous cells and some cornified epithelial cells. During the preovulatory stage, under the effect of estrin, there are largely cornified epithelial cells without any blood constituents. In the postovulatory period there are clumped epithelial cells, with less cornification, and some white blood cells. Then as the effect of progesterin is felt in the premenstrual period, there is moderate cornification and many clumped epithelial cells.

Dr Shorr then discussed certain conditions in which atrophy of the vaginal mucosa is found. At the menopause there is a decrease of cornification, the epithelial cells become smudgy and indeterminate, oval thecal cells appear, bacteria are found and there is an increase of leukocytes. Essentially the same picture is found in amenorrhea, in which there is marked atrophy owing to the absence of estrogens and in which oval cells and leukocytes predominate. The changes that occur in the smears during estrogen therapy were then reviewed: the cytoplasm of the cells changes from lavender to green, there is a decrease of leukocytes and a concomitant increase in the size and development of the epithelial cells, and the amount of cornification is proportional to the degree of replacement. A proliferative endometrium results, from which bleeding may occur four or five days after withdrawal, but with a persistent follicular smear instead of the usual postovulatory picture. Therefore the first half of the cycle can be produced by estrogen substitution therapy, but progesterin is necessary to complete the second half. The combination of these two hormones in castrates results in vaginal smears similar to the normal. Such smears may be of use, therefore, in determining the extent of replacement therapy with estrogens and in controlling treatment in cases of menopausal syndrome and amenorrhea. Using this method to evaluate the efficacy of various estrogenic hormones, it has been determined that it takes 2000 to 3000 rat units per day to cause full estrus in a human being and that all preparations given parenterally are equally effective. Orally about six times the parenteral dose is necessary to produce full estrus, it was further determined that estradiol is more potent than estrone, which in turn is more effective than estrin.

On the basis of vaginal smears, the loss of menopausal symptoms falls into four groups, varying from a slight change toward estrus to complete replacement. In other words, the symptoms are not always proportional to the type of vaginal smear, and a question arises whether other than organic causes account for the symptoms. It may be that there are at present immeasurable factors, for records reveal many cases of recurrence or relief of symptoms without any change of the vaginal smear. In an occasional patient the disappearance of symptoms may be due to recurrent spurts of ovarian activity, especially from the spring to the fall.

In discussing dosage, Dr Shorr pointed out that the parenteral route is, in the final analysis, the most economical. The wide spacing of doses was shown to be wasteful and inadequate for the production of estrus or the steady relief of menopausal symptoms. However, after determining what degree of estrogenic replacement a given patient requires for symptomatic relief, smaller or more widely spaced doses may be administered for those who require only a low degree of replacement, as measured by the vaginal smear, to remain asymptomatic.

Dr Shorr went on to discuss amenorrhea, of which there are primary and secondary forms. The first type,

the acyclic or atrophic form, is usually primary but may be secondary and has a continually atrophic vaginal smear. The second type is acyclic or intermediary and is always secondary, there may be some estrogen activity, but it is always diminished. The third type, which is also always secondary, is cyclic or subfunctional. The vaginal smear reveals a definite cycle of changes with some cornification and slight preovulatory bleeding, but the cycle is too small to produce normal menstruation. The method under discussion enables one to determine whether replacement therapy is indicated. It is necessary to have a previous control period so that one's results may be properly evaluated.

For the acyclic, atrophic form of amenorrhea, full replacement therapy with estrogens should be carried out. They should be administered every month for two years in doses large enough to give a cornified smear. Bleeding should occur on withdrawal. This therapy should be continued for several years. The effect of such therapy on the uterus is minimal, compared with that found in the secondary form of amenorrhea.

In following the results of the gonadotropic hormones on secondary amenorrhea, it has been shown that normal menstruation may occur even when there is no evidence of premenstrual activity. The androgens appear to have two different effects on the menopause. When they are administered to patients under estrogen therapy, there appears to be a peripheral neutralization of the latter as mirrored in the vaginal smear and symptoms. On the other hand, there is a definite alleviation of symptoms by androgen therapy in many cases, despite atrophic smears. It has been hypothesized that this is due to a depression of gonadotropic hormone, but the urinary level of this hormone is usually high. In the normal female there is a gradual onset of atrophic smears while the urinary estrogens are still high, therefore, the explanation is probably referable to a depression of the gonadotropic hormones rather than to a peripheral neutralization of the estrogens. The androgens must consequently be considered nonphysiologic, although they often have the desired effect. It was warned that these substances must be used with care and in the proper dosage. In conclusion, Dr Shorr referred to two cases of menorrhagia in which high doses of androgens failed to decrease follicular activity and in which operation revealed cystic ovaries.

The discussion was opened by Dr Samuel Gargill, who was very enthusiastic about the results obtained at the Beth Israel Hospital in ovarian dysfunction, especially in functional sterility. He pointed out that although all women at the menopause reveal the same vaginal smear, only about 40 per cent have symptoms. The most bothersome problem in amenorrhea has been the decision whether to supplement or to use substitution therapy. The discussion was closed by Dr Shorr, who suggested that this problem would persist until some indices for judging ovarian potentialities were found. Although primary amenorrhea is almost invariably acyclic and atrophic in form and associated with somatic defects, this condition can occur in secondary amenorrhea. This, therefore, seldom aids in determining which form of therapy should be employed. In closing Dr Shorr defined the menopausal syndrome—in answer to a question—as an unpleasant group of symptoms sometimes relieved by hormones and usually occurring at the menopause, but occasionally before or after.

MASSACHUSETTS MEDICAL SOCIETY

SPECIAL MEETING OF THE COUNCIL

A SPECIAL meeting of the Council of the Massachusetts Medical Society will be held in John Ware Hall, Boston Medical Library, 8 Fenway, Boston, on Wednesday, April 9, 1941, at 10:30 a. m., by vote of the Council on February 5, 1941, as provided in Chapter IV, Section 1, of the by-laws.

Business: To consider various changes in the by-laws recommended to the Council at its meeting on February 5, 1941 by the Committee on Medical Education and Medical Diplomas and by the Committee to consider new officers and by-laws.

Incidental business.

ROBERT N. NYE, *Secretary pro tempore*.

Councilors are asked to sign one of the two attendance books before the meeting. The Cotting luncheon will be served immediately after the meeting.

NOTICES

ANNOUNCEMENT

DR. ROBERT R. LINTON announces the opening of an office at 1101 Beacon Street, Brookline.

JOSEPH H. PRATT DIAGNOSTIC HOSPITAL

A series of weekly clinics on disorders of the blood will be given by Dr. William Dameshek on Wednesday afternoons from 3:30 to 5:00 during April and May in the auditorium of the hospital, 30 Bennet Street. These informal presentations will deal with cases of anemia, leukemia, polycythemia, vitamin deficiencies and with certain aspects of the blood cells and bone marrow.

All physicians and medical students are welcome. Admission is free. Those who wish to attend must register in advance, either by telephone (HAN 5650) or by mail (Secretary of the Postgraduate Division, 30 Bennet Street, Boston).

BOSTON DOCTORS' SYMPHONY ORCHESTRA



The Boston Doctors' Symphony Orchestra will rehearse under Alexander Thiede, formerly concertmaster of the Cleveland Symphony Orchestra, every Thursday at 8:30 p.m. Those interested in becoming members should com-

municate with Dr. Julius Loman, Pelham Hall Hotel, Brookline (BEA 2430).

MASSACHUSETTS ASSOCIATION FOR OCCUPATIONAL THERAPY

"Occupational Therapy Pays Its Way" is the title of a dramatization to be presented by the Massachusetts Association for Occupational Therapy at the annual meeting of the New England Hospital Assembly, March 14, at

the Hotel Statler. In a series of four skits it will show how occupational therapy has become a valuable aid in the care of the ill through scientifically applied activity directed toward physical, social and economic rehabilitation.

Represented in the cast will be Dr. Roy D. Halloran, superintendent of the Metropolitan State Hospital and president of the Massachusetts Occupational Therapy Association. Others include therapists from the Robert B. Brigham, Massachusetts General, Children's, Faulkner and McLean hospitals and the Boston School of Occupational Therapy.

MASSACHUSETTS SOCIETY FOR RESEARCH IN PSYCHIATRY

The next meeting of the Massachusetts Society for Research in Psychiatry will be held at the Grafton State Hospital on Thursday, March 13, at 8 p. m.

PROGRAM

Osteitis Deformans Associated with Mental Disease.
Drs. E. V. Semrad and R. Wadsworth and Mr. S. Horwath.

Creatinine-Creatine Excretion in Schizophrenia. Dr. W. Corwin and Mr. S. Horwath.

Report of Committee on Convulsive Therapy, with discussion of plans for the May meeting.

SOUTH END MEDICAL CLUB

There will be a meeting of the South End Medical Club at the headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston, on Tuesday, March 18, at 12 m. Dr. Francis M. Rackemann will speak on "Asthma: Its treatment."

Physicians are cordially invited to attend.

MASSACHUSETTS TUBERCULOSIS LEAGUE

The annual meeting of the Massachusetts Tuberculosis League will be held on Thursday, March 20, at the University Club, Trinity Place and Stuart Street, Boston.

PROGRAM

11:00 a.m. Business meeting.

12:30 p.m. Luncheon.

1:45 p.m. Presidential Address. Dr. Frederick T. Lord.

Keeping Up to Date on Tuberculosis Patients. Dr. Alton S. Pope.

How Are State Rules and Regulations Regarding Tuberculosis Being Carried Out? Miss Margaret S. Boyle, R.N.

3:30 p.m. Board of Directors' meeting.

The charge for luncheon will be \$1.00 per person. Reservations should be sent to: Massachusetts Tuberculosis League, 1148 Little Building, Boston. Tel. HAN 5480.

FREE PUBLIC LECTURES

The Quincy City Hospital, in conjunction with the Social Service Committee, is offering a course of free health lectures to be given in the Administration Building of the Hospital at 3 p.m. on Sundays. The schedule is as follows:

March 9. First Aid: What to do in any emergency. Dr. Frederic N. Manley.

March 16. Diet and Care of Infants. Dr. Edmund Fitzgerald.

- March 23. Diet and Reducing: How to retain that ideal weight. Miss Marjorie L. Foster.
- March 30. Signs, Symptoms and Treatment of Cancer. Dr. Walter L. Sargent.
- April 6. "Magic Bullet" and Venereal Diseases. Dr. Edwin E. Smith.
- April 13. Fractures, Broken Bones, X-rays and Splints. Dr. F. Ramon Burke.
- April 20. Signs, Symptoms and Treatment of Appendicitis. Dr. J. Edward Knowlton.

NEW ENGLAND OTO-LARYNGOLOGICAL SOCIETY

The regular spring meeting of the New England Oto-Laryngological Society will be held on Wednesday, March 19, at the Massachusetts Eye and Ear Infirmary, 243 Charles Street, Boston, at 4 p.m. The evening program will be devoted to a symposium on "The Management of Some of the Complications Arising from Acute and Chronic Otitis Media." Discussion will follow by Drs. Harold Tobey, Charles T. Porter, Maxwell Finland, Champ Lyons, W. Jason Mixer and Charles S. Kubik.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, MARCH 9

SUNDAY, MARCH 9

- 11 p.m. The Pathway of Medical Discovery Dr. Reginald Fitz Free public lecture. Harvard Medical School, Building D

MONDAY, MARCH 10

- 12 15-1 15 p.m. Clinicopathologic conference Peter Bent Brigham Hospital amphitheater.

TUESDAY, MARCH 11

- 9-10 a.m. Psychiatric Examination of Recruits Dr. A. W. Stearns Joseph H. Pratt Diagnostic Hospital
- 12 15-1 15 p.m. Clinicoradiogenologic conference Peter Bent Brigham Hospital amphitheater.
- 8 p.m. Ten Years' Experience with Avertin Drs. G. A. Leland and R. F. Sheldon New England Society of Anesthesiology Massachusetts General Hospital, Waite Auditorium
- 8 15 p.m. Harvard Medical Society. Peter Bent Brigham Hospital amphitheater.

WEDNESDAY, MARCH 12

- New England Hospital Assembly. Hotel Statler
- 9-10 a.m. Hospital case presentation Dr. S. J. Thinnhauser Joseph H. Pratt Diagnostic Hospital.
- 12 m. Clinicopathologic conference Children's Hospital

THURSDAY, MARCH 13

- New England Hospital Assembly. Hotel Statler
- 8 30 a.m. Combined clinic of the medical, surgical, orthopedic and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital, at the Peter Bent Brigham Hospital
- 9-10 a.m. The Enzymatic Breakdown of Carbohydrates Dr. G. Schmidt, Joseph H. Pratt Diagnostic Hospital
- 8 15 p.m. Mechanical Derangements of the Knee Dr. Edwin F. Carey United States Naval Hospital, Chelsea

FRIDAY, MARCH 14

- New England Hospital Assembly. Hotel Statler
- Massachusetts Association for Occupational Therapy. Hotel Statler
- 9-10 a.m. The Neurologic Complications of Some of the Common Contagious Diseases Dr. R. C. Eley Joseph H. Pratt Diagnostic Hospital

SATURDAY, MARCH 15

- 9-10 a.m. Hospital case presentation Dr. S. J. Thinnhauser, Joseph H. Pratt Diagnostic Hospital

*Open to the medical profession
*Open to the public

MARCH 8—American Board of Ophthalmology Page 201, issue of AUGUST 1

MARCH 9-APRIL 20—Free public lectures, Quincy City Hospital Page 436

MARCH 13—Pentucket Association of Physicians Page 263, issue of AUGUST 15,

MARCH 13—Massachusetts Society for Research in Psychiatry. Page 436.

- MARCH 18—South End Medical Club Page 436
- MARCH 19—New England Oto Laryngological Society Notice above
- MARCH 20—Massachusetts Tuberculosis League Page 436
- MARCH 21-22—New York University College of Medicine, Alumni Day, Page 135, issue of January 16.
- MARCH 26—Tufts College Medical School Alumni Association Page 348, issue of February 20
- MARCH 31-APRIL 4—Sixth Annual Postgraduate Institute of the Philadelphia County Medical Society Page 349, issue of February 20
- APRIL 2-4—New England Health Institute Page 308, issue of February 27
- APRIL 21-25—American College of Physicians Page 1065, issue of June 20
- APRIL 28-30—American Academy of Physical Medicine Scientific sessions Hotel Pennsylvania, New York City
- MAY 21, 22—Massachusetts Medical Society, Boston
- MAY 28-JUNE 2—American Board of Obstetrics and Gynecology Page 262, issue of February 6
- JUNE 2-6—American Medical Association Cleveland, Ohio.
- OCTOBER 14-17—American Public Health Association Page 135, issue of January 16.

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

- APRIL 2—Pediatric Problems in General Practice Dr. Joseph Garland Addison Gilbert Hospital, Gloucester
- MAY 14—Relation of the Doctor to the Law Mr. Ireland Powers New Ocean House, Swampscott

FRANKLIN

MARCH 11.

MAY 13

Meetings will be held at 11 a.m. at the Franklin County Hospital, Greenfield

NORFOLK

MARCH 25—To be announced

MAY 8—Censors' meeting Hotel Puritan

SUFFOLK

APRIL 30—Page 604, issue of October 10

MAY 1—Censors' meeting Page 261, issue of February 6

WORCESTER

MARCH 12—Memorial Hospital, Worcester

APRIL 9—Hahnemann Hospital, Worcester

Supper at 6 30 p.m. followed by a business meeting and scientific program

BOOK REVIEWS

Medical Nursing. By Edgar Hull, M.D.; Christine Wright, R.N., B.S., and Ann B. Eyl, B.S. 8", cloth, with 168 illustrations, including 11 color plates. Philadelphia: F. A. Davis Company, 1940. \$3.50.

This textbook for nurses, written by an internist, a nurse and a dietitian, is the answer to the busy student nurse's prayer. It is a concise, authoritative book, written from the nurse's standpoint.

Not only are the medical subjects adequately treated, but each chapter also contains a discussion of the special nursing problems involved. A presentation of pertinent dietetic factors adds to the value of the text. The subject matter in general is handled thoroughly, is distinctly up to date and deals not only with diseases of the system, but also with such subjects as the deficiency diseases, metabolism and allergy. There are adequate discussions of chemotherapy, the use of Dilantin in epilepsy, and some of the more recent uses of dihydrotachysterol in hypoparathyroidism. Proper emphasis is placed on the necessity for avoiding starvation diets in cases of peptic ulcer.

A book by three authors inevitably contains occasional overlapping or omission of some subject matter. Thus one finds a detailed description of the diet for patients

suffering from chlorosis, but the authors fail to describe the disease itself. Such oversights are few, however, and detract little from the excellence of the book. The print is clear, and the division of each page into two columns ensures easy reading.

This book is recommended as a worthwhile addition to the nurse's library.

A Manual of Neurohistologic Technique. By Oscar A. Turner, M.D. 4°, cloth, 73 pp. St. Louis: C. V. Mosby Company, 1940. \$2.00.

This valuable contribution to neurohistologic technic is to be commended for the clarity and conciseness of its presentation. It is intended for technicians working in a general pathological laboratory. The methods considered may be carried out on formalin-fixed tissues. A bibliography has been included for those who wish to delve further into the subject. The last few decades have added much to the nature and function of the nervous system, and this book will serve to give insight into some of the steps taken in this direction.

Public Health Administration in the United States. By Wilson G. Smillie, A.B., M.D., Dr.P.H. Second edition. 8°, cloth, 553 pp., with 22 figures, and 9 plates. New York: Macmillan Company, 1940. \$3.75.

Public-health administration differs considerably in the various parts of our country. Even in a circumscribed location, rural, municipal, state and federal health administrations and the voluntary health organizations may well show diversified practices. Public-health administration must necessarily be based on preventive medicine. The principles of preventive medicine are constantly changing, and with them public-health administration.

In his earlier volume Dr. Smillie selected public-health administrative methods that had been employed by competent men and had been proved to have merit. In the present volume he has included the changes that have occurred during the preceding five years.

Owing to the Social Security Act of 1935, public-health activities have made more advances during the last five years than they did during the previous quarter of a century. Improvement in administrative procedures in the control of scarlet fever, typhoid fever, measles, whooping cough, influenza, syphilis, gonorrhea and pneumonia has necessitated a revision of the chapters on these diseases in the light of present knowledge. Knowledge concerning nutrition has increased appreciably, and community efforts to improve nutrition have made important changes in health programs. The public-health administration for epidemic encephalitis, tularemia and trichinosis has been added to this volume.

An appendix is furnished that gives qualifications for various health personnel and a two-foot reference shelf for local health departments. Comprising about one hundred pages more than the previous edition, this volume should be indispensable to the local health administrator.

Inasmuch as concise information is furnished regarding therapy and epidemiology of a large number of diseases that the physician will meet in his practice, this volume should be of interest to the general practitioner.

Tuberculosis and Genius. By Lewis J. Moorman, M.D. 8°, cloth, 272 pp., with 10 portraits. Chicago: University of Chicago Press, 1940. \$2.50.

Since the victims of tuberculosis have been herded together in sanatoriums, forced to submit to the tyrannical rules of community life and restrained to a purely vegeta-

tive existence, they have reacted in various ways to the abnormal conditions thus imposed upon them. Struck by some of these reactions, numerous clinicians have felt the urge to become amateur psychiatrists, and have tried their newly discovered talent on the rich material placed at their disposal by a kindly providence. Such tentatives are noble inasmuch as they mean an effort to understand and to help the sick. They become less than useless when they serve as a foundation for fantastic theories.

Tuberculous patients have been branded as dissolute erotics and beautified as angels of chastity; they have been described as ferocious egotists and also presented as generous Don Quixotes; they have been shown to cower abjectly in the presence of illness and then to bear its trials heroically; they have been seen to despair at the thought of death, and on the contrary, to exhibit the traditional *spes phthisica*; they have been alternately relegated among the morons and exalted to the rank of geniuses. The poor wretches! So bad and yet so good! So low and still so high! Are they really different from the rest of humanity? Why attribute any of their traits to the tubercle bacillus? The nervous cells may be influenced, to some extent, by the physiologic alterations resulting from a disease—any disease—and the psyche may feel some repercussions. The reactions will manifest themselves by an accentuation of the natural traits of the individual temperament, so slight as to be imperceptible in most cases. Far more important than this biological factor is the commotion resulting from the moral upheaval that is the necessary accompaniment of illness: fear of death, physical pain, humiliation, financial worries, idleness, lonesomeness, and so forth. These being in direct proportion to the seriousness of the disease and to the length of treatment it requires, is it any wonder that tuberculosis ranks first among mental disturbers?

So much for the patients who are known to be tuberculous and who are themselves aware of their condition. When it comes to excursions into history such as that of Dr. Moorman, to diagnoses based on assumptions and to theories soaring to such heights as the seventh heaven of genius, one has the right to feel dizzy!

First, even the diagnoses are to be questioned. Take the case of Voltaire. Could not he have had bronchiectasis instead of tuberculosis? Could not he have been a dyspeptic? He had the facies of one. If he did have tuberculosis, the bacilli that took eighty-four years to kill their man were not sufficiently biting to sharpen the incisiveness of his cynical wit. Besides, to be certain that the spark of genius was kindled or even made brighter by the tubercle bacillus in any of these powerful minds one would have to eliminate all other possibilities. Knowing the artistic temperament, one may be permitted to suggest the existence of a sprinkling of spirochetes.

The author's theory itself may also be challenged, for it is entirely based on assumptions and beliefs. In his twenty-five-page introduction, he records the opinions of numerous writers concerning the influence of tuberculosis on the minds of those suffering from the disease. They run as follows: "Some authorities have held that. . . ." "Some people ascribe their genius to. . . ." "It is entirely conceivable that the tuberculous byproducts are capable of. . . ." "Erick Stern is inclined to attribute the manifestations of genius to the toxic action. . . ." All this is too weak for a foundation.

Genius transcends contingencies. Molière, Keats and Shelley would have been Molière, Keats and Shelley, regardless of their tuberculosis, just as Balzac, DeQuincey and Poe would have written beautifully without coffee, opium and alcohol. Let us continue to show to our pa-

vents those mighty figures and to point to their accomplishments in the face of handicaps. To tell them that the creative power of genius is enhanced by the toxins of such or such a germ would seem to be unjustifiable.

The Neuroses in War. By several authors under the editorship of Emanuel Miller, MA (Cantab), MRCP, DPM (Camb), with a concluding chapter by H. Crichton Miller, MD, FRCP. 8°, cloth, 250 pp. New York: Macmillan Company, 1940. \$2.50.

A group of authors under the guidance of Dr. Emanuel Miller have written about their experiences in World War I in regard to the care of soldiers suffering from psychoneuroses. The whole subject, including the early literature, is carefully reviewed, and authorities in special fields discuss the particular problems associated with the psychoneuroses. The book, therefore, should form an excellent basis for the care of the psychoneuroses as they develop in World War II. A little has been added, in the form of an appendix, about the treatment facilities in 1940 for civilians, and there are a few pages on psychiatric pharmacology, a subject that has become important in the last year. Some reports have appeared in regard to the treatment of men evacuated from Dunkirk with drugs, particularly those of the narcotic type used as a basis for psychotherapy. The value of this method is not by any means widely accepted, but the fact that it is being used justifies the inclusion of a brief notice in this book.

The volume, in general, is of value as a summary of our knowledge of the psychoneuroses under war conditions and as an indication of how patients so afflicted ought to be treated in the present emergency.

Clinical Diabetes Mellitus and Hyperinsulinism. By Russell M. Wilder, MD, PhD, FACP. 8°, cloth, 459 pp., with 19 illustrations. Philadelphia and London: W. B. Saunders Company, 1940. \$6.00.

In this excellent monograph are summarized the clinical experience of the author during twenty-five years largely devoted to diabetes mellitus. Emphasizing the complexity of the subject, he has purposely omitted extensive consideration of the theory of carbohydrate metabolism, the physiology of experimental diabetes and the pathology of diabetes. He adheres to the unitarian conception of diabetes—an abnormality of metabolism due to insufficiency of the insulin activity of the pancreas. The homeostasis of the blood sugar level is permanently disturbed, a fact that distinguishes diabetes from all other conditions including diseases of the liver, central nervous system and endocrine glands, in which hyperglycemia, if it occurs, is but temporary. The primary cause of diabetes is therefore an inadequate insular reserve. The influence of the pituitary gland, adrenal glands and liver is important in regulating the level of the blood sugar, but not in the primary causation of diabetes. The author stresses the hereditary inferiority of the insular reserve.

Almost all patients at the Mayo Clinic who require insulin are given protamine zinc insulin. Methods and dosages are discussed in detail. Nearly fifty pages are devoted to dietary treatment. The many complications, including acidosis, surgery, pregnancy and diseases of the nervous system, liver, arteries, skin, genitourinary tract, thyroid and pituitary glands, receive careful clinical presentation. The important subject of hyperinsulinism, with special reference to tumors of the islets of Langerhans, is given forty pages and will be found worthy of careful study by any physician faced with the difficult problems of diagnosis and treatment when this condition is suspected.

Organization, Strategy and Tactics of the Army Medical Services in War. By Lieutenant Colonel T. B. Nicholls, MB, ChB. With chapters by Air Commodore A. S. Glynn, MB, ChB, KHS, RAF, Colonel A. R. Laurie, MB, ChB, DMRE (TA), and Colonel F. G. Lescher, Medical Corps, MA, MD, MRCP (TA). 8°, cloth, 488 pp. London: Baillière, Tindall and Cox, 1940. Obtainable in the United States from Williams and Wilkins Company. \$5.00.

The second and enlarged edition of this book by Lieutenant Colonel Nicholls is a valuable contribution to military medical literature. The author's wide experience during World War I, in the Royal Army Medical Corps, of the British Expeditionary Force, when he commanded almost every kind of unit in the field, has given him a thorough grasp of the needs and difficulties of the medical department in war. The text of this edition has been revised so that the pages can be more easily read, and emphasis has not been placed, as in the previous edition, on every trivial statement.

Part I discusses general principles. The magnitude of the organization, the necessary personnel and enormous amount of equipment of the medical services of a nation in modern war are adequately described. Not only must the medical services be equipped to care for large numbers of casualties, but they must also be able to evacuate promptly all those able to be moved. Medical officers should have in mind, at all times, the primary objective of returning all casualties rapidly to duty, in other words, to conserve the man power of the nation at war.

The following fundamental principles are stressed: the first duty of the medical services is the preservation of the health of the troops, a reserve of supplies and personnel must always be kept, time spent in reconnaissance, by medical officers in command, is rarely wasted, tactical requirements must be pre-eminent, so that the demands of the medical services take second place, the collection, professional care and treatment of sick and wounded, as well as their evacuation, are duties of the medical services.

The chapter, "General principles," is of value in pointing out to medical officers the fundamentals on which action of the army, as a whole, is based. If the medical officer in command of a unit understands these seven principles, his own activities will be intelligent, and his ability to meet and solve his problems will be greater. The chapter, "The appreciation of the situation, deserves careful study. The chapter, "Calculation of casualties," with a double page table of casualties in the battles of World War I, gives a striking picture of the sudden heavy burdens thrown on the medical services.

Part II takes up in detail the organization and equipment of each medical unit, from front to rear: regimental aid post, advanced dressing station, main dressing station, casualty clearing station, and so forth. It includes a new section, "Transportation of casualties by air," which is in structure, although more applicable to desert and frontier warfare, as in India, Egypt or Iraq.

Part III, strategy and tactics, with application to the medical services, is important. With a good knowledge of them, an officer will be able not only to understand better his orders and instructions, but also to adapt his medical organization to the varying conditions of the battle, as well as possibly to anticipate the outcome.

Part IV, "Medical Arrangements for Military Casualties at Home," by F. Graham Lescher, of the Emergency Medical Services, covers a new and, at present, very important subject. Truly a war between nations, as carried on now, is a war on men under arms as well as on women and children—barbarous and cruel.

Part V, "Problems and Exercises," is primarily for officers of the Royal Army Medical Corps, and therefore is less useful to medical officers of the United States Army.

The list of abbreviations used in the text, with their meanings, a full index, which needs some corrections, and blank pages for memoranda and notes, at the end, add value to the volume. The book can be strongly recommended for study and reference by military medical officers.

The Injured Back and Its Treatment. Edited by John D. Ellis, M.D. Contributing authors: H. Earle Conwell, M.D., Loyal Davis, M.D., Nathan S. Davis, III, M.D., John D. Ellis, M.D., Ralph K. Ghormley, M.D., Hale A. Haven, M.D., Professor Sir Arthur Keith, F.R.C.S., F.R.S., and Robert B. Osgood, M.D. 4°, cloth, 377 pp., with 156 illustrations and 3 tables. Springfield, Illinois: Charles C Thomas, 1940. \$5.50.

In this book a group of well-known industrial and orthopedic surgeons have collaborated to give a complete account of the present knowledge of spinal injuries. The book is well edited, and the illustrations are good. Beginning with a discussion on the acquisition of the upright posture in man, it reviews in turn the physiology of referred pain as well as local pain in relation to various injuries of the back, and then discusses the various etiologic factors that produce spinal disabilities. The chapter on examination of the back is one of the best parts of the book; it covers satisfactorily all the things that the examiner should consider and then gives a helpful summary for the interpretation of the findings.

Treatments of all types are discussed. Since this treatise is written primarily for those who already have some familiarity with spinal injuries, the discussion of treatment and of the various indications is probably adequate. However, the outline of treatment is not sufficient as a guide for the general practitioner, for whom a fuller description of therapy and a discussion of what not to do would be helpful. One would like to see also a fuller account of therapy for the more chronic disabilities of the spine, particularly those in patients who fail to get well under the simple, indicated types of treatment. There is no mention of treatment in Marie-Strümpell disease and osteoarthritis, or in slowly progressive metastatic cancer involving the spine. All these not infrequently must be considered in the diagnosis and treatment of spinal injuries. The book is well arranged and well written. A complete bibliography follows each chapter. It should be a valuable reference book for orthopedic and industrial surgeons, and is recommended without hesitation as the best treatise on spinal injuries yet published in the English language.

The Life of Sir William Osler. By Harvey Cushing, M.D. Complete in One Volume. 8°, cloth, 1417 pp., with 10 illustrations. New York: Oxford University Press, 1940. \$5.00.

Harvey Cushing's *Life of Sir William Osler* is one of the great medical biographies. Few books written about doctors give such a fine picture of a medical colleague. It was first published in two volumes in 1925, with numerous illustrations, being priced at \$12.50. Many medical students, for whom the book was intended, were unable to purchase it because of the expense, and therefore the same work, without deletion so far as the text is concerned, has been issued in a single volume for \$5.00.

Unfortunately, the present edition is not quite what one would desire. Many of the illustrations of the first edition have been omitted, and for the original frontispiece, one of the most charming illustrations of a doctor ever reproduced, a photograph of the Vernon Plaque has been substituted. The profile is hard and cold, and reflects nothing of Osler's warmth and charm, characteristics so strongly a part of his personality.

There is evidence, moreover, of considerable haste in compiling this volume. Some of the corrections printed subsequent to the issue of the first edition have been incorporated in the new work; others have been omitted, and some have been "corrected" incorrectly. In the leaflet issued in connection with this edition, there are a number of errors, some of which can be attributed only to gross carelessness on the part of the publisher. In one picture, for example, a young man standing beside Sir William Osler is identified incorrectly as his son.

Finally, the book is too heavy and large for convenient handling. Medical students are more likely to avoid such a book than to read it thoroughly. It is the kind of work that should form part of a "Bedside Library," similar to that advocated by Osler himself. Surely, this awkward, heavy volume is not the kind of book that anyone would read in bed.

There is also to be issued, according to the leaflet, a two-volume edition, priced at \$10.00. No indication is given whether or not this is a reprint of the original, with all illustrations. If it is a true reprint, with the corrections properly made, any medical student wishing to acquire this biography of the greatest physician developed in the Western Hemisphere would do well to purchase the more inclusive volume.

The Compleat Pediatrician: Practical, diagnostic, therapeutic and preventive pediatrics. By Wilburt C. Davison, D.Sc., M.D. Third edition. 8°, cloth, 256 pp. Durham, North Carolina: Duke University Press, 1940. \$3.75.

In publishing *The Compleat Pediatrician*, Dr. Davison has imposed a great debt of gratitude not only on specialists, but also on all doctors charged with the care of children, sick or well. For the word "compleat" in the title is no misnomer. The whole body of pediatrics is compressed in this book, which is not too big to carry in pocket or bag.

The arrangement — if there are any who are unfamiliar with the book — is encyclopedic; it is a pediatric Baedeker. To investigate a problem of practice one may start from one of several angles, either with the name of the disease or with the presenting symptoms. In any case, through the cross references he will be carried through differential diagnosis to such laboratory procedures as are needed to confirm or deny his suspicions. If treatment is in doubt or if there are questions relating to growth or development, to hygiene or to disease prophylaxis answers may be found. The book is an inexhaustible mine of facts that are forever eluding one's memory. And, as Dr. Davison truly says, "a mere reminder often makes a physician the master of a situation."

In structure this third edition closely follows the second, but it has involved the changing of some 10,000 lines, and it contains the essential information from 3700 additional articles. It is a book that will grow on a man with use; indeed the reviewer is free to say that if he were to be restricted to a single book in this field, *The Compleat Pediatrician* would be his choice.

The New England Journal of Medicine

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VOLUME 224

MARCH 13, 1941

NUMBER 11

FACTORS IN THE REDUCTION OF MORTALITY FROM PULMONARY ABSCESS*

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SINCE the time of Hippocrates¹ reports concerning the management of lung abscess have appeared periodically in the medical literature. In the last two decades the frequency of these reports has increased greatly, but their substance, so far as results are concerned, remains much the same—to the distress of all who read of failure to treat ade-

or in various combinations supportive therapy, drug therapy, postural drainage, bronchoscopic aspiration and pneumothorax treatment. The dismal results obtained by these measures are presented in Table 1. The second is the uniform, almost stereotyped conception of leading authorities about the proper management of the patient with abscess of the lung. This conception is, essentially, that such a patient should be treated by a strictly conservative and supportive regime for at least six to sixteen weeks, or until he proves that he needs additional aid by his rapidly declining course, which threatens to terminate fatally under

TABLE 1 Results of Medical and Miscellaneous Treatment by Methods Other Than External Drainage of Abscess

YEAR	AUTHORITY	No OF CASES	RESULTS		
			DEAD	LIVING WITH DISEASE IMPROVED OR ON IMPROVING	CURED
			%	%	%
1898	Wrighton ²	36	56	33	11
1919	Lord ³	97	74	18	7
1932	Smith ⁴ (collected cases)	940	40	—	—
1934	King and Lord ⁵	114	35	25	40
1935	King and Berger ⁶				
	Abscess	12	58	—	—
	Gangrene	41	44	44	13
1940	Rosenblatt ⁷	73	47	47	7

*Theoretical estimate based on 97 cases.

†Calculated from published results in medically treated group; no correction made for inevitably fatal cases that were transferred to surgery.

‡Calculated on basis of published chart excluding cases classified by authors as bronchitis and pneumonia.

§Calculated from author's tables; surgically treated cases excluded.

TABLE 2 Results of Generally Accepted Plan of Combined Medical and Surgical Treatment

YEAR	AUTHORITY	No OF CASES	DEAD	RESULTS		
				DISEASE IMPROVED OR ON IMPROVING	LIVING WITH DISEASE	CURED
				%	%	%
1929	Flick, Clerk et al. ⁸	161	14	36	50	50
1934	King and Lord ⁵	210	3	28	35	35
1934	Brumby ⁹	205	50	—	50	—
1936	Allen and Blackman ¹⁰	94	30	17	53	—
1936	Cutler and Gross ¹¹	89	38	20	42	—
1938	Ries, Major and Romano ¹²	239	42	—	—	—
1940	Sweet ¹³	124	34	17	49	—

*Calculated from authors' figures.

†Cases classified by author only as improved or dead. Undoubtedly cures were included in improved group.

‡Cases in which abscess as secondary to bronchogenic carcinoma are omitted.

quately this serious disease. There has been a failure in spite of the tremendous amount of research that has been done on the subject, in spite of vast improvements in diagnostic facilities and in spite of great progress in the development of therapeutic measures, including the recently introduced chemotherapeutic agents.

In making a critical study of the extensive literature that has accumulated, one cannot help being struck by several salient facts. The first is the failure of conservative treatment alone in all well-controlled series. This is meant to include the application of the following measures, either alone

the existing form of treatment. Only after this trial period, or after the patient has run his swiftly failing course, should surgery be carried out. This plan of treatment has not been significantly altered in the last forty years. In practice this combined management has also failed, as Table 2 shows. Such high mortality rates and low cure rates condemn this type of management, which has been given adequate trial. The third striking fact encountered is that unquestionably surgery in its broadest meaning must also be classed with

*Presented at the annual meeting of the New England Surgical Society, Poland Spring, Maine, September 28, 1940.

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the therapeutic measures that have failed. In a group of 2114 collected cases of surgically treated lung abscess, reported by Allen and Blackman,¹⁰ the mortality rate was 34.2 per cent. We believe that future statistics will prove that surgery will continue to fail so long as this term is used to include a multitude of operative procedures, the value of which has been conclusively disproved by uniformly bad results.

Inasmuch as practically all the reports in the literature were based on hospitalized cases, it caused us to wonder whether some patients recover from abscess of the lung without being admitted to an institution, and whether the disease is actually so serious as the reports led us to believe. To determine whether or not this was true, we made a survey of 100 patients with lung abscess, proved by clinical history and chest roentgenograms. This study was made possible by the co-operation of various diagnostic clinics, sanatoriums and private offices, where patients in all stages of the disease are seen, including some patients who recovered without hospitalization. However, much to our dismay, we found that even in this highly representative group of cases the results were not far different from those in the other reported cases. Thirty-one patients died of the disease. Persistent symptoms were present in 20 of the group. Forty-nine were asymptomatic.*

What, then, is the answer to this problem? To date the most hopeful solution is found in the reports coming from Dr. Harold Neuhof and his associates, in which lung abscess is treated as a surgical problem from the onset, and immediate and early drainage is employed. The most recent publication from his clinic¹⁴ concerns the results of this type of treatment in 104 consecutive cases. There were 4 deaths in the series, and the vast majority of the survivors were cured. It is our firm belief that anyone can obtain similar results if, and only if, he abides by the sound pathological and surgical principles on which this excellent work is founded.

The purpose of this paper is to present our conception of the proper management of lung abscess, based largely on the results obtained in treating 95 cases in the last eight years. In the group of patients treated by various generally accepted therapeutic measures, excluding external drainage and excision, the mortality rate was 53 per cent, and the cure rate 26 per cent. In the group of patients treated by lung resection the mortality rate was 23 per cent, the cure rate 62 per cent. In the group treated by external drainage at an advanced stage of the disease the mortality

rate was 32 per cent, and the cure rate 26 per cent. *In the group of patients treated by external drainage at an early stage of the disease the mortality rate was 6 per cent, and the cure rate was 94 per cent.* The cases in the latter group are comparable to the ones reported by Neuhof and Touroff.¹⁴

DEFINITION

Lung abscess may be defined as any suppurative infection with cavitation, arising primarily as a result of implantation of a group of pyogenic organisms in the periphery of the tracheobronchial tree. This therefore includes all such conditions described in the literature as "pulmonary abscess" or "pulmonary gangrene," many cases described as *suppurative disease of the lung* or "pulmonary suppuration" and cases of "acute putrid abscess of the lung" or "aputrid abscess." We have excluded only the following types: those primarily a part of a general pyemia; those which are tuberculous; those secondary to unquestioned primary bronchiectasis; and those secondary to pulmonary tumors.

PRACTICAL PATHOLOGICAL CONSIDERATIONS

Several fundamental pathological considerations are of definite practical value and therefore deserve discussion.

Bacteriology

Our bacteriologic studies have been of help in a single but important way. They have emphasized the generally accepted fact that the majority of lung abscesses are caused either by strictly anaerobic organisms or by a combination of aerobes and anaerobes. It is therefore imperative to establish early and adequate oxygenation of the abscess cavity, if the concentric invasion of the histolytic bacteria is to be stopped. The consistent and dramatic conversion of a ragged, putrid-smelling abscess cavity into a clean, odorless, granulating wound in a short period, after the use of zinc peroxide paste, has demonstrated to us the value of adequate oxygenation. The rapid reversal of this reaction during the early postoperative period, when the chemical is omitted, indicates that it is very beneficial to supply even a greater amount of oxygen than an adequate external drainage tract affords.

Location

The location of an abscess, with relation to the surface of a pulmonary lobe in which it is situated and with relation to the limiting surfaces of the pleural cavity, is of great importance. The position of 91 abscesses in our group was definitely

*Cure was not used because final roentgenograms to rule out the presence of persistent infiltration were not available in many cases.

determined (Table 3 and Fig. 1). All the abscesses were located peripherally with regard to the lobe in which they were situated. Furthermore, a portion of the wall of the cavities was in juxtaposition

duration. Since all abscesses are almost invariably located peripherally and since pleural symphysis develops at an early stage of the disease, it is possible to employ external drainage early and as a

TABLE 3. Location of 91 Abscesses.

LOCATION	RIGHT LUNGS			LEFT LUNGS			ALL LUNGS
	UPPER	MIDDLE	LOWER	UPPER	LOWER	TOTAL	
Posterior	6	0	23	7	24	31	60
Lateral	6	0	0	6	0	6	12
Anterior	2	2	0	1	0	1	5
Mediastinal	1	0	0	0	0	0	1
Paravertebral	0	0	3	0	1	1	4
Interlobar	2	1	1	4	1	5	9
Totals	17	3	27	18	26	44	91

to the surface of the pulmonary segment. Thus in the vast majority of cases the abscesses were readily accessible for surgical drainage.

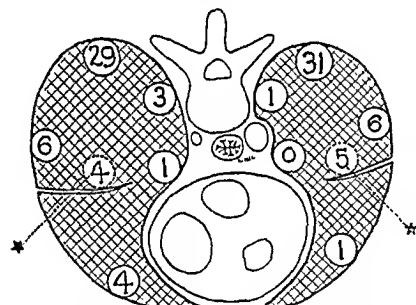
Condition of Overlying Pleura

The presence or absence of pleural symphysis, overlying the abscess, has a vital bearing on surgi-

single-stage procedure, with the provision that localization is accurate.

Contents of Cavity

To us the most outstanding pathological consideration concerns the contents of the cavity. In the great majority of cases of abscess of the lung the cavity contains not only fluid pus, but also a semisolid slough of necrotic lung tissue and debris. The presence of solid debris within the cavity has been mentioned by previous writers, but the role it plays in the prevention of solid healing of the cavity has not been emphasized. It is one of the principal causes of failure of all therapeutic methods based on internal drainage. This mass of amorphous debris interferes with oxygenation of the cavity and obstructs drainage of the communicating bronchus. In a small percentage of cases the bronchial opening is large enough, or the slough becomes sufficiently liquefied, to permit its evacuation via the bronchus. Should this mass find an



* ABSCESSES NOT CENTRAL BUT PERIPHERAL, POINTING ON INTERLOBAR FISSURES

FIGURE 1. Diagram Illustrating Location of 91 Abscesses in Respect to Lung Boundaries.

Each number indicates the frequency with which lesions were found in each location. Sixty of the lesions were in the vertebral gutter. Forty-seven of these, or 51 per cent of the entire number, were in the apex of the lower lobe. (See Table 3 for lobe distribution.)

cal management. We were able to determine definitely the condition of the pleura overlying 84 abscesses. With only three exceptions, pleural symphysis between lung and chest wall was present (Table 4). In two of the three exceptions the abscesses pointed on the interlobar fissure, where adhesions were present. It is noteworthy that adhesions were present just as consistently in the group of lesions under six weeks in duration as they were in the group of greater

TABLE 4. Condition of Pleura over 98 Abscesses.

CONDITION OF PLEURA	CASES UNDER 6 WEEKS' DURATION	ALL CASES
Abscesses pointing on periphery of lung:		
Pleural symphysis present	24	75
Pleural symphysis absent*	1	1
Undetermined	5	13
Totals	30	89
Abscesses pointing on interlobar fissures:		
Symphysis between lobes, no symphysis to chest wall	1	1
Interlobar empyema, no symphysis to chest wall	1	1
Interlobar empyema, symphysis to chest wall	6	6
Undetermined	1	1
Total	9	9

*Abscess secondary to aspiration of foreign body.

exit, complete recovery with conservative methods of treatment may follow. However, in the vast majority of cases the bacteria-laden mass becomes more or less inspissated and encapsulated, acting as a foreign body that prevents union of cavity

walls, and solid healing fails to take place. Not only does it prevent solid healing, but it acts as a bomb, teeming with virulent and invasive bacteria, which constantly menaces the life of the patient until it is removed. At any time the delicate balance between the patient's resistance and the destructive force of the bacteria may be upset, and the patient may develop one of the fulminating exacerbations so characteristic of lung abscess. A patient, even though asymptomatic, should never be considered cured and out of danger until careful roentgenographic examination proves that there is no persistent intrapulmonary infiltration, however small, indicating the presence of such a focus.

Pathological Classification

We have found it helpful to separate the lesions, according to the stage of development, into two groups: simple lung abscess and complicated lung abscess. The characteristics of the two stages are summarized as follows (Figs. 2, 3, 4 and 5):

SIMPLE LUNG ABSCESS	COMPLICATED LUNG ABSCESS
Primary cavity unilocular or multilocular.	Same.
Contents of cavity fluid pus, usually with necrotic slough or semisolid debris.	Same.
Abscess located peripherally in lobe.	Same.
Early pleural symphysis present.	Symphysis usually less extensive if abscess is chronic.
Zone of pneumonitis, varying in width, surrounds primary cavity.	Same, except zone is more extensive.
No daughter abscesses in zone of pneumonitis.	Single or multiple daughter abscesses present in zone of pneumonitis not located superficially and not communicating with the primary cavity.
Secondary bronchiectasis absent.	Secondary bronchiectasis present.
Fibrosis minimal.	Fibrosis minimal to very marked.
Duration: approximately four fifths of cases are under six weeks.	Duration: approximately four fifths of cases are over six weeks.

By correlating the preoperative roentgenographic findings and the observations made during and immediately after operation, it is possible in almost every case to determine whether an abscess falls into the simple or the complicated group. We realize that such a classification is not ideal, inasmuch as it is not possible in many cases to distinguish between a simple multilocular abscess and a complicated one, with its associated daughter abscesses, on roentgenographic appearances alone.

In spite of this objection we believe that it is far superior to a purely chronological classification, which gives no consideration to the disease present. To evaluate the results accurately it must first be determined with what one is dealing pathologically. In cases of simple lung abscess all locu-

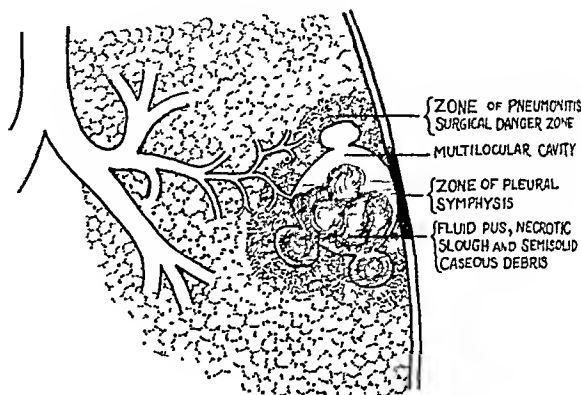


FIGURE 2. Diagram of a Simple Abscess.

The single abscess cavity is usually multilocular. Semisolid debris within the cavity is a common finding. Note the small caliber of the draining bronchus. Frequently the communicating bronchus becomes partially or completely occluded either with caseous debris from the center of the cavity or from edema of its mucosa

lations—if present at all—communicate freely with the primary cavity; there is no secondary bronchiectasis, and the amount of fibrosis is minimal. Therefore, one simple incision and drainage of the primary cavity of a complicated abscess can by no means be expected to effect a cure. The persistent isolated daughter abscesses and bronchiectatic dilatations act as reservoirs of smoldering infection, which at any time may flare up into a fulminating pneumonitis or gangrene. When such a course of events follows external drainage of a complicated lung abscess, it is much more probable that it is due to persistence than to recurrence of the disease.

Surgical Danger Zone

Another surgical pathological consideration that deserves special emphasis is that incision, cauterization or any other manipulation of the zone of pneumonitis that surrounds all abscess cavities must be religiously avoided. This zone may very properly be called the "surgical danger zone," because any encroachment on it is attended in certain cases by alarming and even fatal complications. The same warning applies to the traversing of normal lung tissue in an approach to the cavity. Such disturbance breaks down Nature's defense mechanism, which is pitted against virulent and invasive bacteria, thus favoring the development

of a rapidly spreading and frequently fatal pneumonitis. It also invites the next most important group of complications, which are caused by em-

lodgment of septic emboli; other temporary or permanent signs of intracranial involvement such as psychosis or hemiplegia; and generalized pyemia.



FIGURE 3. Posteroanterior (A) and Lateral (B) Roentgenograms.

This was a lung abscess of unknown etiology in a boy of twelve; it had been present for three weeks, with the condition becoming steadily graver. The abscess in the upper lobe developed in the beginning, with rapid spread of infection to the lower lobe, and the development of a second cavity there. Note the fluid level in one of the cavities. Separate thoracotomy for each abscess and single-stage drainage resulted in prompt recovery with complete healing.

boli that arise as a direct result of the manipulation. These are manifested clinically by sudden



FIGURE 4. Diagram of a Complicated Abscess.

The zone of surrounding pneumonitis is extensive. Daughter, or secondary, abscesses fail to communicate directly with the primary cavity. Bronchiectasis has developed in the corresponding pulmonary segment. Empyema may or may not be present. Note the semi-solid caseous debris that is found within the cavities.

death on the operating table, because of air embolism or other embolism; intracranial suppuration, usually brain abscess or meningitis, owing to the

The risk involved in traversing the surgical danger zone is well shown by a very critical analysis of our cases. After careful study we separated them into two groups: those in which the surgical danger zone had been traversed, regardless of the reason, and those in which this zone had not been traversed. The results are shown in Table 5. An increase in the mortality rate of 300 per cent should certainly make one exceedingly wary of manipulating the danger zone in any way. It should be

TABLE 5. Results According to Whether or Not the Surgical Danger Zone Was Traversed.

SURGICAL APPROACH	NO. OF CASES	NO. OF DEATHS	MORTALITY RATE %
Danger zone not traversed	33	3	9
Danger zone traversed	30	8	27*

*Two late deaths from the disease are not included

pointed out that external drainage of lung abscesses in the complicated stage was by far the most important single factor that forced us to traverse the danger zone. It is technically impossible to drain certain daughter abscesses without cauterizing or incising through this zone. The next most important cause of traversing the danger zone was inaccurate localization in our earlier cases.

METHODS OF TREATMENT AND RESULTS

Miscellaneous Therapeutic Measures

In the earlier cases in our group there was a tendency to employ methods of treatment, especially various types of collapse therapy and supportive measures, that were considered to be more conservative than early external drainage. Our experience with conservative treatment, including both collapse therapy and other measures, has been uniformly unfavorable. Sixteen patients were

speaking loudly against this type of treatment. It should be pointed out that the results would be much worse if many of the patients in this group who failed to improve had not finally been treated by external drainage or excision.

Lung Resection

Thirteen patients were treated by excision of pulmonary tissue, 6 by lobectomy, 3 by lobectomy in addition to subtotal excision of an additional lobe, and 4 by total pneumonectomy. The indica-



FIGURE 5 Posteroanterior (A) and Lateral (B) Roentgenograms.

Symptoms of abscess were apparent ten days after herniorrhaphy under difficult general anesthesia in a man of thirty-eight. The original area of pneumonitis and excavation involved only the apex of the lower lobe. Within three weeks there was rapid dissemination of the infection and pulmonary gangrene, with a fatal termination. Note that the suppurative process was limited to the posterior portion of the lung, which was the dependent portion, while the patient remained flat on his back. Note fluid level in lateral film.

treated primarily by various types of collapse procedures in different combinations. When one

TABLE 6. Results of Miscellaneous Therapeutic Measures.*

RESULTS	NO OF CASES	PER CENT
Dead	10	53
Living with disease	3	16
Cured	5	26
Unknown	1	5
Total	19	

*At the beginning of treatment there were 10 cases classified as "simple" and 9 as "complicated."

operation failed another was tried. In 11 of the 16 cases after collapse therapy had failed, additional surgery was carried out, usually after the abscess had reached the complicated stage. The results obtained in this entire miscellaneous group, including 3 patients in whom no surgical treatment was given and those treated by collapse therapy, are given in Table 6. The deplorable results

for the operations in 11 cases were extensive involvement with fibrosis, multiple isolated abscesses and well-established bronchiectasis demonstrated by lipiodol injection.

In 2 of the 13 cases it was impossible to exclude the possibility of peripheral cancer, and complete excision was deemed the safest procedure. The results are shown in Table 7.

The first postoperative death was due to sepsis following a right middle lobectomy in a man of fifty-five years of age. Excision was chosen because the lesion was suspected of being peripheral carcinoma. The next death occurred in a twenty-four-year-old woman who had had previously a two-stage thoracoplasty that failed to control a post-tonsillectomic lung abscess of the upper lobe. Owing to the previous operations, lobectomy was difficult from a technical standpoint. In addition to this, the lesion had extended from the lower lobe into the upper, which necessitated subtotal

resection of that lobe in addition to the resection of the lower lobe. The patient died four days post-operatively, because of a contralateral bronchopneumonia. The third patient also had a lobectomy with excision of part of an additional lobe for the same reason. Death occurred three days postoperatively from a spreading pneumonitis and cerebral embolism. Lobectomy and pneu-

center of the abscess cavity. The lipiodol can be seen on the final roentgenograms, and the lamp black shows up clearly at the time of operation. It is therefore possible to be far more exact in approaching the abscess cavity by establishing the relation of the underlying cavity to the suspension as seen in the x-ray films and as seen at operation. A 25-gauge needle with

TABLE 7. *Results of Lung Resection.*

OPERATION	NO. OF CASES	OPERATIVE DEATHS	TOO RECENT TO CLASSIFY	CURED
Lobectomy	6	1	0	5
Pneumonectomy	4	0	2*	2
Lobectomy with partial excision of additional lobe.....	3	2	0	1
Totals	13	3 (23%)	2	8 (62%)

*Asymptomatic but with persistent drainage from empyema

monectomy are procedures necessitated only in neglected and complicated cases. If drainage is established during the early simple stage of the disease, resection will seldom be required.

External Drainage

The success or failure of external drainage of lung abscesses depends on whether or not accurate localization has been established before the incision of the lung abscess is undertaken. This explains the failure of surgeons in the past to treat this disease successfully. They were hopelessly handicapped without the aid of adequate roentgenographic equipment. In spite of the highest degree of surgical skill, they were doomed to failure without exact methods of localization. An error of even an inch, especially in draining simple lung abscesses, frequently spells the difference between a safe incision and one that passes through free pleura or the surgical danger zone or both.

Because of the importance of accurate localization, the details of a method that we have found very helpful will be given.

Localization. The details of procedure are as follows:

Empty the cavity as well as possible by postural drainage immediately before roentgenograms are to be taken. The purpose of this is to allow air to replace fluid, so that the area of excavation may be more apparent.

Take preliminary posteroanterior, lateral and various oblique films, as determined fluoroscopically.

Review the films for preliminary localization.

Inject 2 or 3 minims of a 30 per cent suspension of lamp black in lipiodol (40 per cent iodine) just beneath the fascia of the external intercostal muscle at its junction with the periosteum of the rib that most nearly overlies the

a blunt bevel should be used to minimize the tendency of the suspension to diffuse from the point of injection.

Take final anteroposterior (or posteroanterior), lateral and oblique films—over-exposed if indicated by the preliminary films. The patient should be rotated to localize the abscess properly. We greatly prefer flat roentgenograms with varying degrees of rotation to stereoscopic films.

Operative procedure. The patient is placed in the Trendelenburg position, during operation, to minimize the possibility of cerebral emboli. In most cases the anesthetic of choice is local anesthesia after preliminary medication with Nembutal followed by morphine and scopolamine. This should be supplemented by the administration of oxygen under positive pressure before incision of the pleura, best given by means of a standard anesthesia machine with a tightly fitting face mask. The danger of bronchogenic spread during the operation is thus minimized by preserving the cough reflex and directing the flow of air toward the periphery of the lung. Positive pressure also prevents the lung from falling away from the chest wall if the pleura is opened either intentionally or accidentally.

Surgical technic. A general outline of the operative technic used at the present time is as follows (Figs. 6 and 7):

The thoracic cage is exposed over the site of the abscess, regardless of its position, and the incision is planned to strike the center of the abscess rather than its most dependent point.

The previously injected lipiodol and pigment are then located, as a guide for determining the position of the underlying abscess.

An 8-cm. to 10-cm. segment of the rib over-

lying the center of the abscess is excised, and the stumps covered with bone wax to prevent infection.

The inferior intercostal neurovascular bundle is ligated proximally and distally, and the su-

parietal pleura — by sharp dissection. From here the procedure may follow two courses:

IF A PLEURAL SYMPHYSIS IS FOUND:

Prepare the wound of the chest wall to pre-

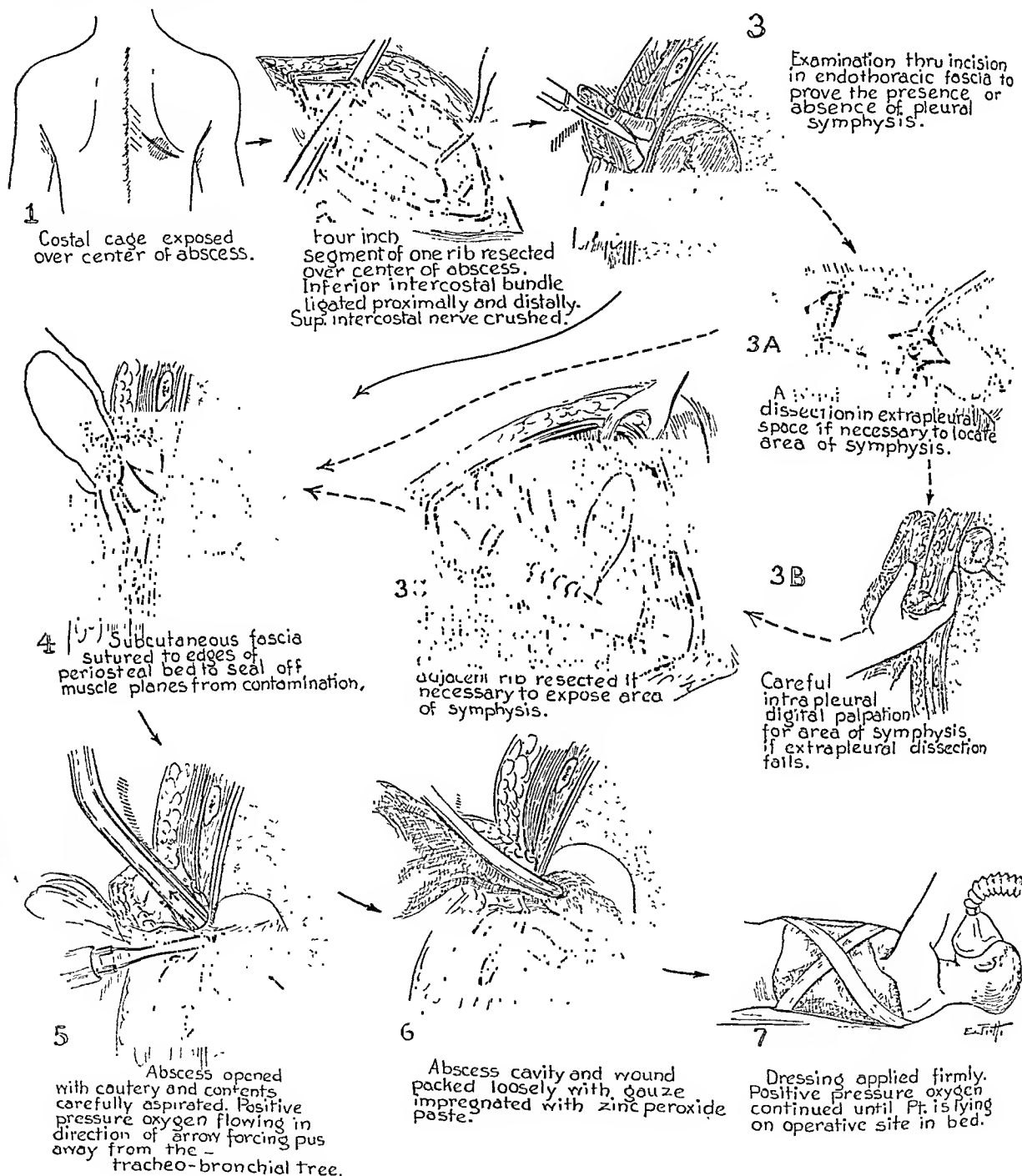


FIGURE 6. Diagram of Steps in Surgical Drainage of a Pulmonary Abscess That Points on the Costal Cage.

3A, 3B and 3C indicate alternate steps, should one fail to find the area of symphysis at the first attempt.

perior intercostal nerve crushed to decrease the discomfort of postoperative dressings.

Positive pressure oxygen is applied.

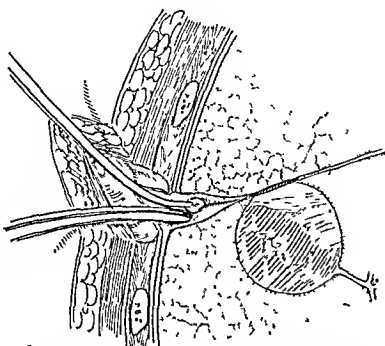
An incision is made through the periosteal rib bed and endothoracic fascia — not through the

vent dissecting infection or cellulitis. This is done by suturing subcutaneous fascia to the periosteal bed and obliterating the muscle planes (Fig. 64).

Insert an aspirating needle (17 gauge)

through the area of pleural symphysis and into the cavity. The needle should not be inserted deeply, and repeated attempts to locate the cavity should not be made.

If pus or putrid air is found, leave needle



1. Interlobar fissure carefully explored by blunt dissection thru incision in rib bed and parietal pleura to locate area of pleural symphysis.

margins of the wound and dry gauze dressing firmly with positive pressure, continued until the patient has been placed on the operated side.

If pus or putrid air is not found, review the



2. Lung margins sutured to parietal pleura and rib bed.



3. Gauze packed into interlobar fissure with metallic marker against area of pleural symphysis. Arrow indicates point at which incision will be made at second stage.



4. Wound closed with interrupted sutures. End of gauze pack protruding from lower angle of wound to allow escape of serum. Second stage incision and drainage carried out in 3-5 days.

FIGURE 7. Diagram of Steps Used in Preparing Drainage Tract for Lung Abscess Pointing on Interlobar Fissure, Mediastinum or Diaphragm.

in place as a guide and open the abscess for a distance of 1.0 to 2.5 cm., depending on the cavity size (Fig. 65); aspirate the contents and pack the cavity loosely with gauze impregnated with zinc peroxide paste; apply boric acid ointment strips to the

Recently, sulfathiazole powder has been used instead of zinc peroxide. One to 5 cm. is applied to the walls of the lung abscess cavity chest wound before the gauze packing is inserted.

localization and, if it is believed certainly that it is correct, cauterize to a maximum depth of 1 cm. over the center of the area of symphysis; if localization is questionable or if no cavity was entered after cauterization, pack with dry gauze with metallic marker in depth of wound; take additional roentgenograms to

check localization and drain the abscess as soon as its position is determined.

IF A PLEURAL SYMPHYSIS IS QUESTIONABLE OR ABSENT:

Enlarge the incision and carefully dissect for a short distance in the extrapleural space.

If the adhesions are located in the extrapleural space, reapproximate the edges of the periosteal incision; expose the parietal pleura over the center of the area of pleural symphysis by removing the necessary structures, for example, additional segments of rib or intercostal muscle, and drain through this area.

If pleural symphysis is not found by dissecting in the extrapleural plane, open the pleura, introducing the finger, and carefully palpate in all directions for the point of adherence. If it is found, mark the chest wall over the area of symphysis. Close the pleural and periosteal incision. The drainage tract in the chest wall should then be prepared over the site of adhesions, and the cavity drained. If the precise localization after exploration is uncertain, the wound may be packed with gauze containing a metal clip as a marker, and drainage may be delayed two to four days. During this interval relocalization by roentgenographic study should be done.

If the adhesions cannot be located and the abscess is thought to be pointing on the interlobar fissure, the mediastinum or diaphragm, dissect carefully along the fissure line, mediastinum or diaphragm until the edge of the area of pleural symphysis is approached. Suture the edges of the parietal pleura to the edges of the adjacent lung or diaphragm (Fig. 7). Pack dry gauze with a metallic marker into the depth of the wound against the area of symphysis. Close the wound with interrupted sutures, with the gauze pack protruding from the dependent angle. Take additional roentgenograms for localization. In three to seven days reopen wound and proceed as when pleural symphysis is found.

Results

The results of external drainage of 67 abscesses in 63 patients* are charted in Figure 8. The entire group has been divided into subdivisions; one consisting of 35 patients with simple abscesses

*Since the above study of results was made, 16 additional cases have come under our observation. Again, we have found that the patient treated during the early acute phase of the disease will recover, whereas delay in surgical drainage spells disaster. Five patients with a simple abscess treated within the first 6 weeks of their illness all recovered. Of the 12 patients treated after the 6-week period 7 recovered. One patient who had suffered from a chronic abscess for 2 years died of an embolism at operation. Eight patients with complicated lesions had had extensive pulmonary destruction. Three patients had extensive gangrene and were moribund when first seen.

and the other of 28 patients with complicated abscesses. The majority of the simple abscesses were under six weeks in duration, whereas the great majority in the complicated group were over six weeks. A comparison of the results in the two groups shows the extreme importance of avoiding delay in carrying out external drainage. All cases

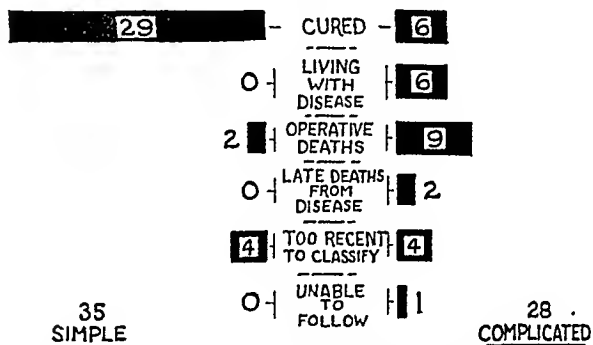


FIGURE 8. *The Results of Treatment of Pulmonary Abscess by External Drainage, Grouped According to the Extent of Damage to the Lung.*

Four fifths of the simple cases were brought to surgery within the first six weeks of their development. The majority of the complicated cases were late cases.

are included, regardless of the stage of the disease, the general condition of the patient, the previous medical or surgical treatment and other factors. Obviously, if the cases treated early in our experience were excluded and only those treated by the methods now used included, the results would be expected to be much better, owing to the improvement in localization and surgical technic.

ONE-STAGE VERSUS TWO-STAGE OPERATION

The entire plan of procedure used at the present time is based solely on the principle that a lung abscess should be incised only at its most superficial point, so that the zone of pneumonitis will not be traversed in any case and so that aspiration or incision will not be made through a free pleura. Inasmuch as practically all abscesses are located superficially with overlying pleural symphysis, external drainage can be carried out safely in one stage, *provided that the abscess has been accurately localized*. Without accurate localization even a two-stage procedure is a very dangerous plan of management. Although the danger of pleural contamination is theoretically removed, the primary error in localization is not corrected, which means that the subsequent incision must be made through the surgical danger zone. Thus with this plan of treatment the operative mortality rate may be expected to increase by nearly 300 per cent, to say nothing of the high percentage of severe postoperative reactions that will occur.

garding the efficiency with which a two-stage drainage protects against the development of empyema, our results are rather surprising. In a series of 67 abscesses, 24 were drained by means of a two-stage procedure, and 43 by a one-stage operation. In the two-stage group, postoperative empyema occurred in 4 cases, whereas in the one-stage group, which is nearly twice as large, postoperative empyema occurred only twice. It should be stated, however, that most of the two-stage operations were done earlier in our experience, and the methods of localization were less exact. Making the wound for the purpose of creating an artificial symphysis is followed at times by an effusion that separates the pleural surfaces. Should it occur the purpose of the two-stage operation is defeated. Furthermore, abscesses have been known to rupture, with the production of empyema, before the second stage could be performed.

We believe that the above considerations indicate any objections to one-stage drainage based on the danger of pleural contamination. The only other objection to a one-stage operation is based on the fear of development of a serious dissecting cellulitis of the chest wall. This objection is theoretically well founded. However, in actual practice the occurrence of such infections is very infrequent. A probable explanation is that the aerobic organisms rapidly lose their invasive characteristics as soon as they are exposed to the amount of oxygen afforded by a wound that is kept widely open—especially if zinc peroxide paste is used. In the 43 cases with one-stage operations there was only 1 in which a spreading infection occurred, and this cleared up rapidly after a counterincision, 5 cm. in length, was made. In this experience we have employed measures to obliterate the fascial and muscular planes. This can be accomplished by suturing the subcutaneous fascia to the intercostal muscle bundle. In 27 cases treated in this way spreading infection from the wound edges has not occurred. The danger of cellulitis of the chest wall becomes insignificant when compared with the possibility of pneumonic spread after the first stage of a two-stage procedure. In our group of 24 cases in which two-stage drainage was planned, 2 patients died before the abscess could be drained. A similar experience is commonly mentioned in the literature. We believe that a two-stage operation has a definite and a useful place in the treatment of lung abscess. However, we also consider its usefulness to be limited to a very small group of cases, especially to those in which the abscess is pointing on the mediastinum, on an interlobar fissure without symphysis, on the costal cage, and on the diaphragm. It is

occasionally necessary when technical difficulties are encountered.

TIME OF EXTERNAL DRAINAGE

So long as early external drainage continues to produce results similar to those that it has produced to date, we shall consider that, in general, it should be carried out as soon as the diagnosis of lung abscess can be established definitely, and localization can be agreed on. To postpone external drainage is to encourage the relentless progress of the disease from the simple to the complicated stage. This means that the cure rate will drop from 94 to 26 per cent, and that the mortality rate will soar from 6 to 32 per cent (Figure 8). The rapidity with which the disease may pass from the simple stage, through the complicated stage, to death, should be emphasized so that the danger of procrastination may be fully appreciated. The studies of Rives, Major and Romano¹² also indicate the rapid course taken in many cases. In their study of 100 consecutive fatal cases of lung abscess, they found that 73 per cent classed as "frankly hopeless" were of less than one month in duration, and that 75.5 per cent of these cases were less than two months in duration. In view of these figures we are convinced that any feeling for the security of the patient with lung abscess during the first six weeks is false. The frequent statements in the literature that surgery should not be considered until the chronic stage of the disease has been reached, which usually takes from two to three months, are dangerous advice. Associated with such statements is the implication that few if any deaths will occur during this period. When this fallacy is generally comprehended, there should be much less tendency to experiment with uncertain methods of treatment.

We believe that external drainage should be performed without delay for another important reason. We fear that we shall be enticed into the dangerous game of procrastination by the intangible and irresistible human forces far past the point at which our better judgment would ordinarily tell us to stop. This fact is best illustrated by the figures of Brunn,⁹ which give the time that surgical treatment was instituted in a group of 205 cases from four institutions, three of which were teaching hospitals in San Francisco. The duration of the disease averaged four hundred and sixty days. The average duration of medical observation and treatment was one hundred and fifty-four days—twenty-eight days short of half a year!

Practically all writers on the subject have stated repeatedly that recovery from lung abscess by conservative means can rarely be expected after the duration has reached three or, at the most, four months. Still, in this group, the average duration of the disease before operation was over fifteen months, and the average duration of medical treatment in the hospitals was over five months. It is interesting to correlate the effect of this delay on the results obtained in this group (Table 2).

SURGICAL VERSUS MEDICAL TREATMENT

A very close analogy can be drawn between the history of the treatment of lung abscess to date and the early history of the treatment of appendicitis. Shortly before the turn of this century, acute appendicitis was considered by the authorities of the time to be a medical disease. The mortality and morbidity rates were high. Laparotomy at that period was feared, largely because of the results associated with this procedure during the time when its various technical obstacles were being surmounted. Therefore, conservative treatment was routinely carried out until the disease had progressed to such an advanced stage that radical surgical aid was asked for, of necessity. For reasons that are now perfectly obvious, the mortality and morbidity rates with surgical treatment were also very high. Because of this, physicians clung even more tenaciously to conservative medical treatment. Thus a vicious circle was formed, and the results of all types of treatment of appendicitis were poor. And they remained poor until such pioneers as J. B. Murphy, Reginald Fitz, J. B. Deaver and others, after a bitter and prolonged struggle against the authorities of the time, showed that, to obtain satisfactory results, surgical treatment must be instituted at an early stage of the disease, before the pernicious forces of the vicious circle are set in action.

At the present time lung abscess is generally considered to be a medical disease. The mortality and morbidity rates are high. Early external drainage is looked on with apprehension. It is feared that some patients will be submitted to unnecessary surgery. We believe that the foundation of this fear has several components, the main one being the unfavorable results obtained by this procedure without exact preoperative localization of the abscess. Because of the general fear of surgical treatment the so-called "conservative measures" are routinely carried out until they are proved to be inadequate, and the patient's life is threatened. Surgical aid is applied after irreparable damage to the lung has occurred, and the results are necessarily poor. Because of this, the general tendency is to cling even more tenaciously to the

temporizing medical measures. Again a vicious circle has been formed, which, like a whirlpool, continues to take a high toll in life and health from the unfortunate victims who drift into its irresistible influence.

We firmly believe that the only way to obtain a low mortality rate and a high cure rate in the treatment of lung abscess is to employ early external drainage after accurate localization. Inasmuch as lung abscess is a relatively uncommon disease, we are very much concerned about how long it will take to break the vicious circle that now exists and bring early external drainage into general acceptance. Even though appendicitis was and is a very common disease, it took many years and countless debates at medical gatherings to change the status of its treatment from being primarily medical to primarily surgical. Let us hope, for the sake of the welfare of all future patients who suffer from pulmonary abscess, that the present battle that is in progress in regard to proper management will be soon settled. The problem resolves itself to one of numbers and facts.

CONCLUSIONS

The separation of abscesses into acute and chronic stages on a purely chronological basis without regard to the pathologic condition present is unscientific and unsatisfactory. From a practical standpoint it has given rise to a great deal of confusion in evaluating the results of different therapeutic measures. We suggest that this commonly used chronological division be replaced by a classification based on pathology.

It is proposed that lung abscesses be separated into their simple and complicated stages. The simple stage includes a single or a multilocular cavity without secondary bronchiectasis. Complicated abscesses consist of multiple isolated daughter abscesses located in the surrounding zone of pneumonitis, which do not connect with the primary cavity and do not point on the surface of the lobe. In this group we have also included patients who have developed an associated bronchiectasis or empyema.

Lung abscesses are almost invariably situated peripherally with relation to the lobe in which they are located. Therefore, early symphysis between the adjacent pleural layers practically always occurs.

Roentgenographic evidence of cavitation is not essential in establishing the diagnosis. Not infrequently a patient with abscess of the lung will pass through the entire course of the disease to a fatal termination without presenting evidence of definite cavitation.

The generally accepted plan of combined medical and surgical treatment of abscess of the lung continues to keep the mortality over 30 per cent and the cure rate under 50 per cent as shown conclusively by statistics.

In the group of patients treated by us for both simple and complicated lung abscess by miscellaneous methods other than excision or external drainage, the results obtained were poor. The mortality rate was 53 per cent, and the cure rate 26 per cent.

External drainage of complicated lung abscesses has an operative mortality rate of 32 per cent and a cure rate of only 26 per cent.

External drainage of simple lung abscess has an operative mortality rate of 6 per cent with a cure rate of 94 per cent.

The outstanding factor in the development of a complicated from a simple lung abscess is time. Most simple lung abscesses are of less than six weeks' duration. Most complicated lung abscesses are of more than six weeks' duration. Therefore, delay of external drainage, regardless of the reason, parallels directly the bad results obtained. The longer the delay, the worse the results.

Methods of treatment based on internal drainage of the cavity fail because of the small bronchi that lead from it, which provide neither adequate drainage nor adequate aeration of the cavity. These two fundamental factors must be satisfied before healing will occur.

The most important single factor in causing failure of methods based on internal drainage is the presence of semisolid slough or inspissated caseous debris inside the abscess cavities. This precludes the possibility of firm healing and accounts for frequent recurrences.

Intrathoracic spread of the disease is the major cause of death of approximately 85 per cent of patients treated by conservative methods. By far the most important causes of intrathoracic spread are inadequate drainage, faulty aeration of the cavity and any factor that promotes bronchogenic spread of the pus throughout the tracheobronchial tree.

We have outlined in detail the methods of surgical approach, which we believe to be based on sound principles and practical application. The dangers of traversing normal lung tissue or the zone of pneumonitis that surrounds the cavity have been emphasized. With accurate localization one-stage drainage is not only possible but also definitely safer than two stage drainage in the majority of cases.

Lung abscess should be considered a surgical disease from its onset, and early drainage should

be instituted without delay. The provision for external drainage during the simple stage of the disease is the only type of treatment, to date, that has uniformly yielded a high cure rate and a low mortality rate.

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REFERENCES

- 1 Hippocrates cited by Maxwell J. Lung abscess with special reference to etiology and treatment. *Quart J Med N S* 3:457-522, 1934.
- 2 Warrington C F. Pulmonary abscess and gangrene. *Boston M & S J* 138:220-225, 1898.
- 3 Lord F T. Pulmonary abscess. *Contributions to Medical and Biological Research, Dedicated to Sir William Osler in honor of his seventieth birthday, July 12, 1919*. Vol 1. 649 pp. New York: Paul B. Hoeber, 1919. Pp. 640-649.
- 4 Smith D T. Diagnosis and medical treatment of incipient pulmonary abscess. *South Med & Surg* 94:149-152, 1932.
- 5 King D S and Lord, F T. Certain aspects of pulmonary abscess from analysis of two hundred and ten cases. *Ann Int Med* 8:468-474, 1934.
- 6 Hine, B S and Berger, S S. Pulmonary abscess and pulmonary gangrene: analysis of ninety cases observed in ten years. *Arch Int Med* 56:753-772, 1935.
- 7 Rothenblatt M B. Purulent lung abscess: pathogenesis, prognosis and treatment. *J Thoracic Surg* 9:294-321, 1940.
- 8 Fleck, J B, Clerf L H, Funk, E H and Farrell J T, Jr. Pulmonary abscess: analysis of one hundred and seventy-two cases. *Arch. Surg* 19:1292-1312, 1929.
- 9 Brunn, H. Lung abscess. *J A M A* 103:1999-2003, 1934.
- 10 Allen, C L and Blackman, J F. Treatment of lung abscess. *J Thoracic Surg* 6:156-172, 1936.
- 11 Cutler, E C and Gross, R C. Nontuberculous abscess of the lung. *J Thoracic Surg* 6:125-155, 1936.
- 12 Rives, J D, Major, R C and Romano S A. Lung abscess: an analysis of the causes of death in one hundred consecutive fatal cases. *Ann. Surg.* 107:753-769, 1938.
- 13 Sweet, R H. Lung abscess: an analysis of the Massachusetts General Hospital cases from 1933 through 1937. *Surg., Gynec. & Obst.* 70:1011-1021, 1940.
- 14 Neubof, H and Touroff, A S W. Acute purulent abscess of the lung: a surgical disease. *New York State J Med* 40:849-851, 1940.

DISCUSSION

DR. EDWARD D. CHURCHILL, Boston: A paper on lung abscess always offers a real challenge to those of us who are interested in thoracic surgery, and I am glad to be afforded the opportunity to comment on Dr. Overholt's contribution. Statistical studies on lung abscess at the Massachusetts General Hospital go back to 1909. Dr. Lord in 1925 analyzed the results in 227 cases collected between 1909 and 1924. Two hundred and eleven cases recorded between 1924 and 1932 were reported by Lord and King. This year, Dr. Sweet¹³ has published an analysis of 125 cases observed during the five year period, 1933 to 1937 inclusive. As a result of these studies we have a stable definition of lung abscess for purposes of classification, and unfortunately for our own peace of mind, an exact record of what we have accomplished in the therapy of this disease.

Our best results are recorded in the recent analysis by Sweet of 124 consecutive cases. Sixty-one patients, or 49 per cent, were cured; 42, or 34 per cent, died; and 21, or 17 per cent, remained alive with disease. These figures deal with all cases, early and late, complicated and uncomplicated, ably handled and grossly neglected before entering the hospital.

In the entire group of 124 cases only 8 patients came to the hospital soon enough after onset for drainage to be carried out before the end of the sixth week, so that in general this group is comparable to the "complicated" group of Dr. Overholt's in which he places "four fifths" of his cases that were over six weeks' duration and in which he records a mortality of 32 per cent and a cure rate of 26 per cent.

Now we come to the real challenge offered by this pa-

per. Dr. Overholt states that "external drainage of a simple lung abscess has an operative mortality rate of 6 per cent with a cure rate of 94 per cent." Because "four fifths" of the abscesses classified as "simple" were subjected to external drainage within six weeks of onset the conclusion is drawn that "external drainage should be carried out as soon as the diagnosis of lung abscess can be established." If the figures support this conclusion, a specific remedy has been found for a devastating disease that hitherto has carried a mortality rate of 34 or more per cent. When so important an announcement as this is made, the author invites a very critical survey of his documentary evidence.

The series of 35 cases of "simple" abscesses were apparently selected nonconsecutively from a larger group that includes the "complicated" cases. "Approximately four fifths" of the 35, that is, 28 cases, were subjected to external drainage within six weeks from time of onset. It is to be noted, however, that 5 or 6 other cases (one fifth of the group of 28 "complicated" cases) were also subjected to external drainage within six weeks of the date of onset. They are placed in the "complicated" group, in which the group mortality is given as 32 per cent, but no specific information is given regarding the fate of these 5 or 6 patients, in whom we are intensely interested.

We may therefore conclude that Dr. Overholt has drained lung abscesses of less than six weeks' duration in 34 (28 plus 6) patients. Two patients (6 per cent of 35) in the "simple" group died, and lacking information to the contrary, let us assume that all 6 in the "complicated" group died. This gives a mortality of 8 out of 34 or 23 per cent for cases drained under six weeks.

This line of investigation can be carried further. There is no note of spontaneous cures. During two successive five-year periods our spontaneous cure rate has been 21.4 per cent and 19.3 per cent respectively. If it is assumed that 20 per cent of Dr. Overholt's early abscesses would have subsided spontaneously if allowed to do so, it is permissible to state that 7 cases were operated on as a prophylactic measure and proceeded to get well, as they would have done without operation. Subtracting 7 cases from the total of 34, leaves but 27 cases in which external drainage as a curative measure was necessary. Eight of these patients may have died, as already noted—a mortality rate of 30 per cent. Dr. Sweet has shown in an

ingenious table that a patient with an abscess of six weeks' duration faces a mortality rate of 28.9 per cent. A remarkable coincidence!

I know that I have been hypercritical and also quite possibly unfair, particularly in assuming that all 6 patients operated on early and placed in the "complicated" group died. However, it is not sound reasoning to conclude that abscesses should be drained as soon as the diagnosis is made on the basis of results in a selected group of simple abscesses.

So much for the statistical evidence. Another phase of the paper puzzles me a great deal. Within six weeks of onset Dr. Overholt has arrived at a diagnosis of lung abscess and proceeded with external drainage in 34 out of a total of 94 cases during an eight-year period. At the Massachusetts General Hospital the diagnosis has been made and the patient admitted to the hospital under six weeks in but 8 cases out of a total of 124 in a five-year period. I have always thought that in New York Dr. Neuhof might have an unusually alert and well-informed group of medical associates to provide him with his material, but Dr. Overholt brings the problem closer home. Is it possible that we are working with different definitions of lung abscess and that our clinical material is not comparable for this reason? This cannot be judged until Dr. Overholt presents a more detailed account of the patients operated on within six weeks—an account that lists age, sex, location of the abscess, x-ray findings, and particularly etiology.

I find myself in accord with one very important conclusion of Dr. Overholt's paper, a conclusion that should not be overlooked in a squabble about details. The non-operative treatment of lung abscess in the community as a whole is being continued far beyond the point where any reasonable chance for spontaneous cure has passed. Irreparable damage to the lung results, and when surgery is called for, a more radical procedure than external drainage must be employed.

It is not possible to determine by any rule-of-thumb method just when a reasonable expectation of spontaneous cure ceases. This can be judged in the individual case only by careful clinical and laboratory observation, and as a result of experience in the management of the disease. A sound knowledge of the pathology of lung abscess makes it unnecessary to try this or that newly proposed remedy to know whether or not it will work.

REMOVAL OF IODIZED OIL BY LUMBAR PUNCTURE

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BECAUSE of its irritating effects, there has been an increasing tendency to forego the use of iodized oil in myelography and to employ the

surgical condition is present, and the reluctance to use iodized oil under such circumstances is often responsible for prolonged disability of patients

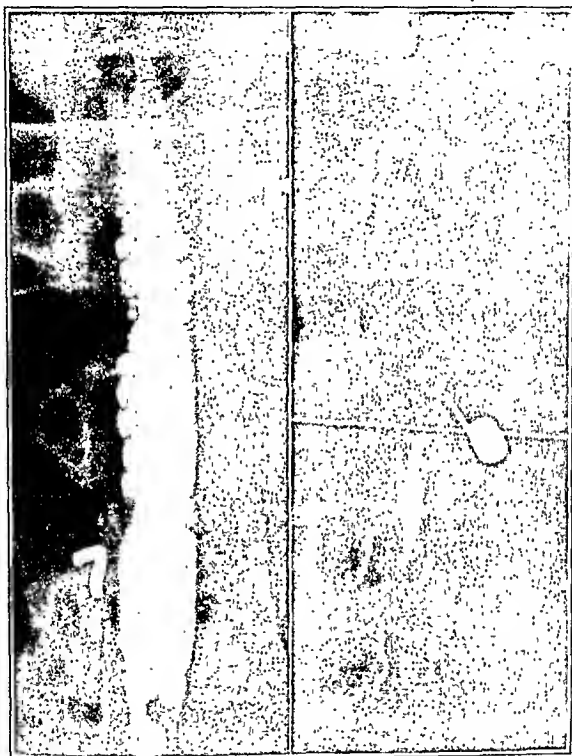


FIGURE 1.

Roentgenograms before (A) and after (B) removal of iodized oil, injected into the lumbar subarachnoid space four days before removal. Small amounts of oil remain in the cul-de-sac and in the sheaths of the nerve roots. The dense shadow represents the hilt of the lumbar-puncture needle, inserted between the third and fourth lumbar vertebrae; the heavy transverse line, a needle on the surface used as a marker.

less reliable procedure of pneumomyelography. If the oil can be removed shortly after its introduction, as may be done when it is accessible at operation, there is no serious objection to its use. One cannot always be certain, however, that a

who might be relieved by surgery. This is particularly true when a ruptured lumbar intervertebral disk is suspected but the history and findings are inconclusive. By the use of iodized oil it can be determined, almost without exception, whether or not a ruptured disk is present, whereas a pneumomyelogram still leaves one in doubt.

We are, therefore, submitting a simple method

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for the removal of iodized oil from the lumbar subarachnoid space.

After the roentgenographic examination has been completed, the patient is placed face down, horizontally, on a fluoroscopic table; the iodized oil is visualized; with the patient still in the prone position, a lumbar puncture is made in the space beneath which the oil is located. The oil, or the greater part of it, is then withdrawn by gentle suction with a small syringe. By tilting the table, un-

An ordinary 18-gauge lumbar-puncture needle is entirely satisfactory; oil introduced only a few hours previously and still very nearly in its original, thick, viscid state can be removed through it without difficulty. When, on the day following introduction or later, the oil is emulsified, it flows more easily, but if it has entered the sheaths of the nerve roots, some of it may not be recovered. We believe that a few globules of oil left free in the lumbar cul-de-sac are of little or no im-

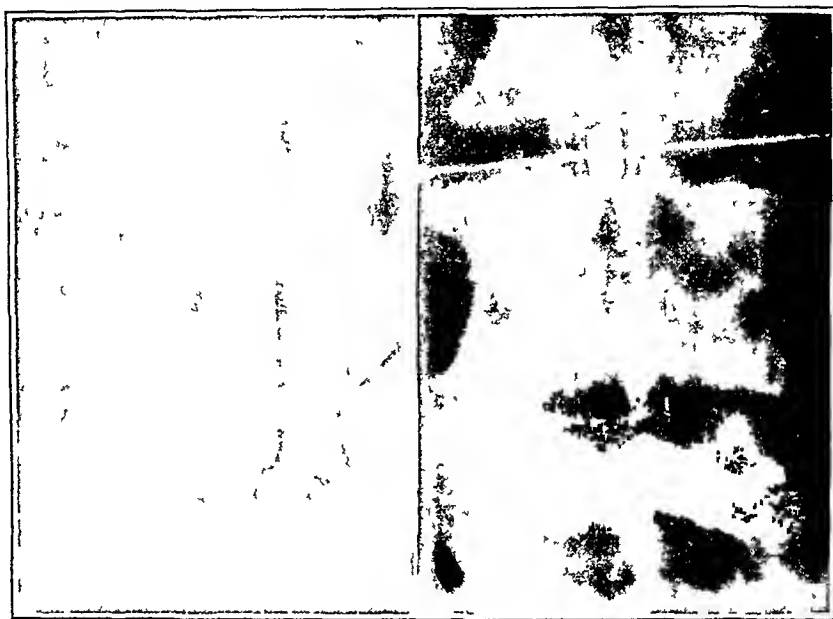


FIGURE 2.

Roentgenograms before (A) and after (B) removal of iodized oil, injected five hours before removal. A few droplets of oil remain in the cul-de-sac. The lumbar-puncture needle was inserted between the third and fourth lumbar vertebrae.

der fluoroscopic control, any remaining oil is brought to the point of the needle and removed. Since small droplets of the oil may not be visualized with the fluoroscope, a film is taken before the needle is withdrawn, to make sure that removal of the oil has been as complete as possible.

A few comments may be added. Before performing the lumbar puncture the table is tilted 20° or so, raising it at the head end, to distend the lumbar cul-de-sac. Then the table is leveled again, bringing the oil back to its original position, or centered round the needle, the point of which should be in the ventral portion of the subarachnoid space. If suction is too strong, pain may result and the flow of oil may stop, presumably because a nerve root or fold of membrane has been drawn against the point of the needle. Using less force and turning the needle overcome this difficulty, which is not very serious and is more likely to occur when the needle, in being inserted, has deviated too far from the mid-line.

portance, although with a little persistence all of it can be removed. Needless to say, the discomfort and incapacity suffered by the patient are insignificant.

Since the above procedure results in more complete removal than is usually possible at operation, it may be used with advantage, if the oil is accessible, even when there is to be an operation later. Another reason for preoperative removal in cases of ruptured lumbar intervertebral disk is that it obviates incision of the meninges, with resulting loss of spinal fluid and unnecessary exposure of the subarachnoid space to infection. The method may also be employed in suitable cases of suspected compression of the cervical or thoracic cord by introducing the oil into the lumbar subarachnoid space instead of the cisterna magna.

We have used this procedure in over 30 cases. It is most effective when the needle is inserted through the third or fourth lumbar interspinous space, although complete removal has been ac-

completed through the second and, on one occasion, the first lumbar space. One obviously tries to avoid the suspected lesion.

It is important to make a neat puncture so that the point of the needle will be near the mid-line, to use no more suction than is necessary to bring the oil very slowly up into the syringe, and not

to continue or, what is worse, increase strain on the needle is blocked. The needle in Figure 1 is badly placed.

For some time we have been introducing the oil with the patient on the fluoroscopic table, leaving the needle in place during the examination, and removing the oil immediately afterward.

THE AUTONOMIC NERVOUS SYSTEM PRIOR TO GASKELL*

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IN a charming tribute to his former teacher, Langdon-Brown¹ (1939) writes provocatively that "to read an account of this [autonomic nervous] system before Gaskell is like reading an account of the circulation before Harvey." During a recent search through the writings of physiologists just prior to Gaskell and Langley, I had the opportunity to ponder this statement and to wonder why so many threads of evidence lay unrecognized until these two men, so curiously different in temperament, began to weave them into the pattern of the visceral nervous system as we know it today. The osmic acid technic, then recently introduced by Schultze, no doubt enabled Gaskell to see the fibers of the autonomic nerves in much clearer outline, but one should not attach too much importance to this factor, since the Weigert method of staining myelinated sheaths had often been used before in studying the constitution of the ventral spinal nerves and, indeed, of the rami communicantes. Gaskell² built his theory on two main lines of evidence: that only the ventral roots in the thoracolumbar and sacral regions contained fine myelinated fibers, and that these fibers were present only in the white rami that were limited to the same regions ‡ It is interesting that although true as generalizations, both observations proved to be inaccurate in the light of subsequent investigation. Nevertheless they gave Gaskell the due to a new understanding of the construction of the autonomic nervous system. The difference between the thoracoventral roots and those elsewhere had been noted as early as 1862 by Reissner,³ and it must have been seen by many others, un-

doubtedly by the great Henle⁴ and by ~~the~~ without their appreciation of its underlying ~~importance~~ cance. There can be little doubt ~~that~~ possessed a quality of genius that ~~not only to see but also to comprehend~~

In like manner, the effect of nicotine on autonomic responses, described by Langley,⁶ gave to Langley another new which to attack an age-old problem. He did not overlook the fact that it was in collaboration with Dickinson, shown to act by interrupting the synapse in the sympathetic ganglion, a fact that was in Langley's approach. Nor can one say that Langley's genius demanded of him a patient and meticulous search, which is that, in the words of Fletcher,⁷ "it is only in their places not merely there to knowledge, but as stones along which, at the progress of knowledge has a

In looking for the germ one is tempted to turn at once to the man who so often predicted the event day. Prior to Bernaretti's nervous system was a wealth of theoretical and factual knowledge. To the sympathy of the "intelligent" proved in 1727 by Pelletier, its constituent fibers were in 1838 by Remak, innervated fibers, as Hermann,¹² who found fibers as sympathetic were little independent between the cerebellum and there had been they communicate.

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to Gaskell apparently counted fifteen instead of thirteen thoracic nerves in the dog so that the subsequent lumbar and sacral nerves in men and dogs might have the same numbering. Thus he gave 15 the lower limit of the thoracolumbar outflow in the dog; the twenty-fifth spinal nerve which he called L2, instead of L4 as it is customarily designated. This rather unfortunate method of numbering led to considerable confusion in subsequent interpretation.

nal roots or both (Müller,¹³ Retzius,¹⁴ Wützer¹⁵). Beck,¹⁶ in 1846, was probably the first to point out that the white rami consist of myelinated (tubular) fibers that emerge from the spinal cord, and that the grey rami contain unmyelinated (gelatinous) fibers arising within sympathetic ganglia, probably in connection with the cells described earlier by Ehrenberg.¹⁷ I¹⁸ have already reviewed this early phase in the literature, and the following remarks on the period just prior to Gaskell should be considered as supplementary to that paper.

It was apparently Senac¹⁹ who, in 1794, first discussed the contractility of the blood vessels in relation to the sympathetic nerves, which he described as embracing the larger arteries and sending fibers along their finest ramifications. Certainly Petit²⁰ in 1727 and subsequently Cruikshanks²⁰ (1795), Arneemann²¹ (1797) and Reid²² (1838-39) had noticed a redness of the conjunctiva after section of the cervical sympathetic ganglion, but they did not appreciate the significance of their observation, nor did Dupuy²³ (1816) and Brachet²⁴ (1837), who described the same "inflammation" of the conjunctiva and an elevation of skin temperature on the ipsilateral side of the face after extirpation of the superior cervical ganglion. Brachet came nearest to the present concept of vasomotor tonus when he remarked that the "inflammation" was not an excitatory effect but an atony or paralysis. Then came the irrefutable demonstration by Henle,⁴ in 1840, of muscular elements in the walls of blood vessels. Before the work of this histologist, the middle coat of the arteries had been designated by different authors as the "muscular tunic," but the term had been purely visionary. Physiologists who had upheld the contractility of vessels had to suppose the presence of muscle in their walls and by happy inspiration had placed it in the tissues of the middle coat. Henle's description and its confirmation in 1849 by Kölliker⁶ removed all doubt about both the arteries and the veins, and the authors did not hesitate to attribute to the nervous system an action on the muscular wall of the vessels. Although experimental proof was lacking, the idea must certainly have been in the minds of physiologists during the first half of the nineteenth century, for in 1840 Stilling²⁵ proposed the substitution of the term "vasomotor system" for the name "sympathetic." The ground was well prepared for the experimental work of Schiff,²⁶ Claude Bernard⁹ and Brown-Séquard²⁷ that provided the proof for the existence of vasomotor nerves. The story of this is so ably told elsewhere (Fulton²⁸) that it need not be dwelt on any further.

The demonstration that such vasomotor fibers

emerge from the spinal cord followed logically Budge and Waller's²⁹ account in 1851 of the pupillary fibers in the lower cervical and upper thoracic regions of the cord and passing out in the cervical sympathetic.* "One of the great merits of the experiment of Budge and Waller," wrote Bernard,⁹ "is that it showed for the first time in an incontestable way that the fibres of the great sympathetic take origin from the spinal cord." And following this line of reasoning, Bernard cut the ventral and dorsal roots of all the nerves that supply fibers to the brachial or the lumbosacral plexus, without causing any change in vascularity or temperature in the corresponding paralyzed and anesthetic extremity. It mattered little whether the ventral or dorsal roots or both were divided. Therefore, concluded Bernard, the vasomotor nerves to the extremity do not arise in the spinal roots that furnish the motor and sensory fibers to the limbs. When, however, he divided the nerve trunks of the plexuses (brachial or lumbosacral), there appeared in addition to the motor and sensory loss an immediate rise in temperature of several degrees in the corresponding foot. This proved that the vasomotor fibers join the motor and sensory nerves to the extremity outside the vertebral canal, and Bernard's attention was naturally attracted to the sympathetic chain. The next logical step was the removal of the stellate ganglion, or of the lumbar sympathetic chain lying on the bodies of the fifth and sixth lumbar vertebrae, and Bernard then obtained the rise in temperature without the motor or sensory changes. Stimulation of the sympathetic chain had the opposite effect of reducing the circulation and lowering the temperature in the limb. The proof of independent vasomotor fibers was therefore complete, but, curiously enough, Bernard did not push the matter further, and the tracing of the exact outflow of the fibers from the cord was left to others. In a significant passage, however, he comments:

It seems to me that sometimes the temperature changes in the posterior extremity followed stimulation of the regions of the spinal cord higher up [than the origin of the lumbosacral plexus], and I have seen an increase in temperature in the anterior extremity and in the ear on cutting the sympathetic chain at the level of the third and fourth intercostals, without any accompanying ocular phenomena.

Thus Bernard predicted that the outflow of the vasomotor fibers would be found in the region of

*Budge²⁹ relates that Petit made his first experiment in Namur in 1712, and later (in 1725) repeated it before Winslow, Senac and Hunant in Paris. Petit had demonstrated myosis on section of the cervical sympathetic, but Biffi,²¹ in 1846, was the first to show that stimulation of this nerve caused dilatation of the pupil. The experiment was repeated by Waller in Bonn, where Budge was then working; thus in 1851 the collaboration of Waller and Budge on the innervation of the iris began.

the spinal cord between the cervical and lumbar enlargements.

The account of the vasomotor nervous system written by Vulpian³² about the time of Bernard's death, and more than a decade before Gaskell's classic paper, reveals an extraordinarily modern outlook. The rami communicantes were by this time fully understood. They were composed of two groups of fibers, one traveling from the spinal cord chiefly along the ventral roots, the other arising in the ganglia and running to the periphery. The vasomotor nerves along their course from the cord to the blood vessels were therefore believed to communicate with one or more sympathetic ganglia. In 1877-1878 Luchsinger,³³ having confirmed Goltz's³⁴ observation that stimulation of the sciatic nerve caused sweating on the corresponding foot, established the existence of true sudomotor fibers in the sympathetic nerves, and proved by stimulation experiments in the cat their emergence from the spinal cord, to the leg from T10 to L4 inclusive and to the arm from T3 to T6 inclusive. Thus the physiologists began placing first the vasomotor, then the sudomotor and ultimately the pilomotor fibers within the thoracolumbar outflow as we know it today, and as early as 1884 Dastre and Morat³⁵ wrote: "From the anatomical standpoint there is a remarkable arrangement, for the sympathetic appears to arise principally from the thoracic region." The authors added, "One can assign to the sympathetic centers a distinct position in the cord, in a chain of ganglionic tissue occupying the outer angle of the anterior horn and known as the tractus intermediolateralis."

In like manner, Bernard,⁹ Schiff³⁶ and Vulpian³² had shown the existence of vasodilators in certain of the cranial nerves,—the chorda tympani and glossopharyngeal nerves in particular,—and Eckhard³⁷ in 1863 had demonstrated a sacral outflow of vasodilators in the nervi erigentes. The relation of the vagus nerve to the "organic" nervous system had been established in 1846 when the Webers³⁸ showed its inhibitory cardiac effect, and the cranial ganglia, the ciliary, sphenopalatine, submaxillary and otic, had all been described and regarded as belonging to the ganglionic nervous system by Arnold³⁹ in 1827. Meanwhile the embryologic studies of Schenk and Birdsall,³⁹ of Balfour,⁴⁰ and particularly of Onodi⁴¹ had given final proof of the spinal origin of the sympathetic trunk.

Thus, as in Bernard's discovery of the vasomotor nerves, the ground was well prepared for Gaskell. This in no way belittles the greatness of his contribution, for we have but to turn to a work similar to his that appeared two years earlier

to see how differently the same data could be interpreted. Schwalbe⁴² had been interested in a proposition that the diameter of a nerve fiber might vary directly with its length, and he therefore examined the ventral roots of several cervical and thoracic nerves in man. Observing that the cervical roots contained only a few fine fibers, whereas in the thoracic roots there were numerous bundles of fibers of 18 to 27 microns in diameter, Schwalbe unfortunately argued that the predominance of small fibers in the thoracic nerves was owing to the fact that they had a shorter course to the periphery than the cervical nerves extending into the arm. Indeed it was some years before the magnitude of Gaskell's advance was appreciated, even by those working in the same field, as is evident from Kolliker's involved account of the sympathetic nervous system in 1894.

To Gaskell, then, must be given the credit for the discovery of the thoracolumbar and craniosacral outflows, although perhaps the story as related here may not fully substantiate the commentary of Langdon-Brown, quoted at the beginning of this article. But to quote again from his delightful paper, "the splendid accuracy of Langley's mental microscope extended and completed the discoveries made by the great sweep of Gaskell's mental telescope," and in illustration of this I call attention to that extraordinarily prophetic statement of Gaskell's² written in 1886

The evidence is becoming daily stronger that every tissue is innervated by two sets of nerve fibres of opposite characters so that I look forward hopefully to the time when the whole nervous system shall be mapped out into two great districts of which the function of the one is katabolic, of the other anabolic, to the peripheral tissues two great divisions of the nervous system which are occupied with chemical changes of a synthetical and analytical character respectively, which therefore in their action must show the characteristic signs of such opposite chemical processes

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REFERENCES

- 1 Langdon Brown W. W. H. Gaskell and the Cambridge Medical School *Proc Roy Soc Med* 33 112 1939
- 2 Gaskell W. H. On the structure, distribution and function of the nerves which innervate the visceral and vascular systems *J Physiol* 7 180 1886
- 3 Reissner E. Neurologische Studien. V. Ueber die Wurzeln der Rückenmarksnerven des Menschen *Arch f Anat Physiol u wissenschaftl Med* 1862 Pt 3 131
- 4 Henle F. G. *Traité d'anatomie générale ou histoire des tissus et de la composition chimique du corps humain* Vol 2 600 pp Paris J B Baillière 1843
- 5 von Kolliker A. Die Selbstständigkeit und Abhängigkeit des sympathischen Nervensystems durch anatomische Beobachtungen bewiesen 40 pp. Zurich Meyer u Zeller 1844. *Zur Lehre von der Contractilität menschlicher Blut- und Lymphgefäße* 10 pp. Leipzig reprinted from *Ztschr f wissenschaftl Zoologie* vol 1 1849. Ueber die feinere Anatomie und die physiologische Bedeutung des sympathischen Nervensystems. *Verhandl ges deutsch Naturforsch u Aerzte* 66 97 120 1894
- 6 Hirschmann L. Zur Lehre von der durch Arzneimittel hervorgerufenen Myos und Mydriasis *Arch f Anat Physiol u wissenschaftl Med* 1863 Pt 3 313
- 7 Langley J. N. and Dickinson W. L. On the local paralysis of peripheral ganglia and on the connection of different classes of nerve fibres with them *Proc Roy Soc London* 46 423 431 1889

8. Fletcher, W. M. John Newport Langley, in memoriam. *J. Physiol.* 61:1-27, 1926.
9. Bernard, C. Recherches expérimentales sur les nerfs vasculaires et calorifiques du grand sympathique. *J. de physiol. de l'homme et des animaux* 5:353-418, 1862.
10. du Petit, F. P. Mémoire dans lequel il est démontré que les nerfs intercostaux fournissent des rameaux qui portent des esprits dans les yeux. *Hist. Acad. roy. d. sc.*, 1727. Pp. 1-19.
11. Remak, R. *Observationes anatomicae et microscopicae de systematis nervosi structura*. 40 pp. Berolini: Sumtibus et Formis Reimerianis, 1838.
12. Bidder, F. H. and Volkmann, A. W. Die Selbständigkeit des sympathischen Nervensystems durch anatomische Untersuchungen nachgewiesen. 88 pp. Leipzig: Breitkopf & Härtel, 1842.
13. Müller, J. Ueber das Ganglion ciliare Arnoldi. *Arch. f. Anat. u. Physiol.* 6:67-86, 1832.
14. Retzius, A. A. Ueber den Zusammenhang der Pars thoracica nervi sympathici mit den Wurzeln der Spinalnerven. *Arch. f. Anat. u. Physiol.* 6:260-262, 1832.
15. Wüster, C. W. Ueber den Zusammenhang des sympathischen Nerven mit den Spinalnerven. *Arch. f. Anat., Physiol. u. wissenschaft. Med.*, 1834. Pp. 305-310.
16. Beck, T. S. On the nerves of the uterus. *Phil. Tr. Roy. Soc. London* 136:213-235, 1846. On the structure and functions of the sympathetic nervous system as distinct from, and independent of, the cerebro-spinal system. *Lancet* 1:615-617, 1847.
17. Ehrenberg, C. S. Nothwendigkeit einer feineren mechanischen Zeilegung des Gehirns und der Nerven. *Ann. d. Phys. u. Chem.* 104:449-473, 1833.
18. Sheehan, D. Discovery of the autonomic nervous system. *Arch. Neurol. & Psychiat.* 35:1081-1115, 1936.
19. Senac, J. B. *Traité de la structure du coeur, de son action, et de ses maladies*. Vol. 2. 694 pp. Paris: Jacques Vincent, 1749. Pp. 281-294.
20. Cruikshanks, W. Experiments on the nerves, particularly on the reproduction, and on the spinal marrow of living animals. *Phil. Tr. Roy. Soc. London* 17:512-519, 1795.
21. Arneemann: cited by Vulpian.²²
22. Reid, J. An experimental investigation into the functions of the eighth pair of nerves, or the glosso-pharyngeal, pneumogastric, and spinal accessory. *Edinburgh M. & S. J.* 49:109-176, 1838. On the effects of lesion of the trunk of the ganglionic system of nerves in the neck upon the eyeball and its appendages. *Ibid.* 52:36-43, 1839.
23. Dupuy, A.: cited by Vulpian.²²
24. Brachet, J. L. *Recherches expérimentales sur les fonctions du système nerveux ganglionnaire et sur leur application à la pathologie*. Second edition. 500 pp. Paris: Germer-Baillière, 1837.
25. Stillling, B.: cited by Vulpian.²²
26. Schiff, M. Sur les nerfs vaso-moteurs des extrémités. *Compt. rend. Acad. d. sc.* 55:400-403, 1862. Des nerfs vaso-moteurs des membres antérieurs. *Ibid.* 55:425-427, 1862. De l'influence des centres nerveux sur la température et des nerfs vasculaires des extrémités. *Ibid.* 55:462-464, 1862. De l'influence de l'action réflexe sur les nerfs vaso-moteurs. *Ibid.* 55:540-543, 1862.
27. Brown-Séquard, C. E. *Lectures on the Physiology and Pathology of the Central Nervous System*. 276 pp. Philadelphia: Collins, 1860.
28. Fulton, J. F. *Selected Readings in the History of Physiology*. 317 pp. Springfield, Illinois: Charles C Thomas, 1930.
29. Budge, J. L. and Waller, A. Action de la partie cervicale du nerf grand sympathique et d'une portion de la moelle épinière sur la dilatation de la pupille. *Compt. rend. Acad. d. sc.* 33:370-376, 1851. Budge, J. L. Experimenteller Beweis, dass der Nervus sympathicus aus dem Rückenmark entspringt. *Med. Zeit.* 21:161, 1852.
30. Idem. *Ueber die Bewegung der Iris*. 206 pp. Braunschweig: Fr. Vieweg u. Sohn, 1855.
31. Biffi, S.: cited by Budge.²⁰
32. Vulpian, A. *Leçons sur l'appareil vaso-moteur*. 2 vol. 1346 pp. Paris: Germer Baillière, 1875.
33. Luchsinger, B. Neue Versuche zu einer Lehre von der Schweisssecretion, ein Beitrag zur Physiologie der Nervencentren. *Arch. f. d. ges. Physiol.* 14:369-382, 1876. Die Schweissfasern für die Vorderpfote der Katze. *Ibid.* 16:545-547, 1878. Zum Verlauf der Schweissnerven der Katze. *Ibid.* 18:483-488, 1878.
34. Goltz, F., Freusberg, A. and Gergens, E. Ueber gefässerweiternde Nerven. *Arch. f. d. ges. Physiol.* 11:52-99, 1875.
35. Dastre, A. and Morat, J. P. *Recherches expérimentales sur le système nerveux vaso-moteur*. 344 pp. Paris: G. Masson, 1884.
36. Eckhard, C. Untersuchungen über die Erektion des Penis beim Hunde. *Beitr. z. Anat. u. Physiol.* 3:123-166, 1863.
37. Weber, E. and Weber, E. H. Expériences qui prouvent que les nerfs vagues, stimulés par l'appareil de rotation galvanomagnétique, peuvent retarder et même arrêter le mouvement du coeur. *Arch. gén. de méd.* Series 4, Supp., p. 12, 1846.
38. Arnold, F. Beschreibung des Kopftheils der sympathischen Nerven beim Kalb, nebst einigen Beobachtungen über diesen Theil beim Menschen. *Ztschr. f. Physiol.* 2:125-172, 1827.
39. Schenk, S. L. and Birdsall, W. R. Ueber die Lehre von der Entwicklung der Ganglien des Sympathicus. *Mitt. embryol. Inst. Univ. Wien* 1:213-228, 1880.
40. Balfour, F. M. Ueber die Entwicklung und die Morphologie der Suprarenalkörper (Nebennieren). *Biol. Zentralbl.* 1:136-138, 1881.
41. Onodi, A. D. Ueber das Verhältnis der cerebrospinalen Faserbündel zum sympathischen Grenzstrange. *Arch. f. Anat. u. Physiol.* 2:143-169, 1884. Ueber die Entwicklung des sympathischen Nervensystems. *Arch. f. mikr. Anat.* 26:61-81, 553-580, 1886.
42. Schwalbe, G. *Ueber die Kaliberverhältnisse der Nervenfasern*. 51 pp. Leipzig: F. C. W. Vogel, 1882.

SUSCEPTIBILITY TO AND LATENCY OF POISON-IVY DERMATITIS*

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SINCE there is considerable difference of opinion about the individual susceptibility to and the period of latency of poison-ivy (*Rhus radicans*, L.) dermatitis, we carried out a series of tests on a group of 23 volunteers.

Knowles et al.¹ found their percentage of reactors to the patch test (50 per cent in 1938 and 40 per cent in 1937) definitely less than that reported by Spain² (65 per cent), by Deibert and his associates³ (59 per cent) and by Straus⁴ (76 per cent). They observed a quicker response to the leaf itself than to any of the solutions employed. The period of latency in their 56 patients tested with the leaf varied from twelve hours to over one hundred and twenty.

McNair⁵ states:

Fontana [in 1795] found the period of latency to be three, four and six days. Van Mons, in 1797, found it

to be from eight to ten days; Horsfield, in 1798, stated that the period of latency varied from a few hours to several days . . . Dakin (1829), one to three days; Bussey (1873), seven days; White (1873), generally less than forty-eight hours but sometimes five days; Park (1879), from a few hours to a few days, generally from thirty-six to forty-eight hours; Cundell-Juler (1883), about twenty-four hours; Morrow (1887), from several hours to four or more days; Pfaff (1897), . . . as long as four days; Conner (1907), often within twenty-four hours.

In 18 cases, McNair noted that the period of latency varied from one to eight days.

A poison-ivy plant was potted and maintained fresh for the experiment. All the original tests were carried out in the early spring within an interval of two weeks. A fresh and previously untouched leaf was removed from the plant at the time of each experiment. A section 2 cm. square was cut from the leaf and rubbed immediately with moderate friction for approximately thirty seconds on two skin areas, one on the flexor surface of the forearm and the other on the lower leg. A dry dressing was applied, and the subject

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was instructed not to wash the areas inoculated until permission was granted. Daily observation was made of the inoculated areas.

Of 3 subjects who presented no reaction at the end of one month, 2 were retested. The same

TABLE 1. *Results.*

CASE No	INCUBATION Day	TYPE OF REACTION*	DURATION days
1	2	Erythema papules pruritus	7
2	18	Small papules, pruritus	2
3		No reaction†	
4	11	Erythema, no pruritus	14
5	6	Fine papules pruritus	16
6	1	Erythema, vesicles pruritus entire flexor surface of arms and forearms affected	21
7		No reaction†	
8	2	Erythema vesicles entire flexor surface of arms and forearms affected	15
9	2	Erythema, vesicles entire flexor surface of arms and forearms affected	21
10	2	Vesicles	21
11	10	Erythema, edema, vesicles	21
12	3	Erythema, edema, vesicles, general red macular eruption	14
13	2	Erythema, edema, bullae	14
14	11	Vesicles	2
15	5	Erythema, edema, vesicles	14
16	11	Papules	5
17	4	Papules, vesicles	11
18	1	Vesicles	5
19	5	Erythema, edema, papules, vesicles	8
20	3	Erythema, vesicles	10
21	2	Vesicles	12
22	8	Papules	3
23		No reaction	

*All reactions limited to the areas inoculated, unless otherwise noted.
†Reinoculated, with similar result.

‡History of previous attacks of poison ivy dermatitis.

method was repeated, except that the leaf was rubbed energetically on the skin—in an area previously untouched—until bleeding points had formed, after which small bits of the leaf were strapped to the skin areas for twenty-four hours.

The persons thus tested were of both sexes and were all between twenty and thirty years of age.

There were approximately equal numbers of Anglo-Saxons, Italians, Irish, Armenians and Jews. The skins of all those tested were neither excessively dry nor seborrheic.

The results were as follows (Table 1). Twenty of the 23 subjects gave a positive reaction. Of these, 15 reacted to the first known exposure. The shortest period of latency was one day, the longest eighteen days and the average six days. The duration of the reaction varied from two to twenty-one days. The cases of shortest incubation and most marked reaction were usually those of longest duration as well.

There were no apparent variations according to sex, race or site of inoculation.

Whereas one of the darker-skinned subjects (Case 4), had a long period of latency and a very mild reaction another (Case 9) had a short period of latency and a marked reaction.

The two subjects who showed immunity, even after the second test, were Jewish, and fair of skin. One perspired profusely, with an otherwise normal skin; the other had a skin in no way different from the other subjects tested. Neither had ever experienced an attack of poison-ivy dermatitis.

REFERENCES

- 1 Knowles F C, Decker, H B, Pratt, A G and Clarke J A, Jr. Susceptibility of allergic and nonallergic persons to *Rhus toxicodendron*. *Arch Dermat & Syph* 38 773 779, 1938.
- 2 Spain W C, Newell J M and Meeker M G. Percentage of persons susceptible to poison ivy and poison oak. *J Allergy* 5 571 574 1934.
- 3 DeLert, O., Menger E F and Wigglesworth A M. cited by Blank J M and Coca, A F. Study of the prophylactic action of extracts of poison ivy in control of *Rhus dermatitis*. *J Allergy* 7 552 555 1936.
- 4 Straus H W. Artificial sensitization of infants to poison ivy. *J Allergy* 2 137 144 1931.
- 5 McNair J B. Pathology of *Rhus dermatitis*. *Arch Dermat & Syph* 3 393 403 1921.

CLINICAL NOTE

A SIMPLE MICROMETHOD FOR THE DETECTION OF ACETONE IN URINE

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THE usual tests for acetone in the urine are the Legal test¹ and such modifications as those of Jackson-Taylor,¹ Lange² and Rothera.² A modification³ of the Rothera test employs a powder derived from a mixture of ammonium sulfate and sodium nitroprusside. All these tests require several cubic centimeters of urine and have sodium nitroprusside as their principal reagent. In the test to be described, only a few drops of urine are required, and the entire procedure is simplified.

The principal reagent for this test is a 5-gr. (0.35-gm.) tablet† made from a mixture of 1 part of finely powdered sodium nitroprusside and 40 parts of ammonium sulfate. The tablets are stable.

For the test, a tablet is placed on a white porcelain tile or dish. Three drops of urine are then placed on the tablet, followed by two drops of concentrated ammonium hydroxide. If acetone is present, a purplish color appears at the periphery of the tablet within thirty to sixty seconds, and becomes maximum within three to five minutes. After five minutes, the color tends to change to

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brown. For this reason, the test should be read at the end of five minutes.

In comparing this test with the usual macromethods, predetermined amounts of acetone were added to normal urine, and the tests were done simultaneously. In the higher concentrations of acetone, there was complete agreement of the two methods, but when the concentration of acetone became low, the micromethod was noted to be slightly more sensitive. For example, when the concentration of acetone in the urine was 0.02 per cent, a clearly positive reaction was noted with the micromethod, whereas the reaction was equivocal with the macromethod.

This test is an improvement on the macromethod because it is simpler and involves fewer steps and less apparatus; it can be performed on very small amounts of urine—3 to 4 drops instead of 3 to 4 cc.; it is timesaving, because many such urine tests can be set up and done simultaneously; it is more economical because it saves on reagents; it is as accurate as the macromethod and slightly more sensitive with low dilutions of acetone.

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REFERENCES

1. Gradwohl, R. B. H. *Clinical Laboratory Methods and Diagnosis*. 1028 pp. St. Louis: C. V. Mosby Co., 1935. P. 65.
2. Todd, J. C. and Sanford, A. H. *Clinical Diagnosis by Laboratory Methods*. Eighth edition. 792 pp. Philadelphia: W. B. Saunders Co., 1936. P. 131.
3. Joslin, E. P. *Treatment of Diabetes Mellitus*. Fifth edition. 620 pp. Philadelphia: Lea & Febiger, 1935. P. 193.

MEDICAL PROGRESS

POPULAR MISCONCEPTIONS PERTAINING TO OPHTHALMOLOGY

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PROGRESS consists not alone in the appreciation and utilization of newly discovered facts but also in the realization and correction of prevalent misconceptions. Although the majority of misconceptions pertaining to ophthalmology are not serious in the sense that they interfere with medical practice, they are, in view of their universality, the source of unnecessary health precautions and of a not inconsiderable economic waste. So far as health is involved, it is the privilege and obligation of the medical profession, presumably the most qualified judge, to exercise its authority.

ILLUMINATION

The beliefs that relatively intense illumination is necessary for visual efficiency and that weak

illumination induces organic disease of the eyes are probably the most widely held misconceptions pertaining to ophthalmology. This is represented in the following quotation from a semiscientific treatise: "Improper lighting conditions and the misuse of light and the eyes are so effective in causing eyestrain and permanent injury to the eyes."¹

The public has been subjected to a "research offensive"² in matters of illumination, aimed toward the development of a widespread consciousness of lighting. As a result, there has been a "newborn confidence [that] increases interest and decreases resistance on the part of the user of light and lighting."³ The nucleus of this movement is in the Incandescent Lamp Department and the Lighting Research Laboratory of the General Electric Company from which have come an impres-

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sive number of technical and popular books and pamphlets by Luckiesh, Moss and their collaborators. These authors claim to have established a new science "born of radically new concepts,"² the science of seeing. This science transcends the usual ophthalmologic and optometric practices, which "seek primarily to correct ocular defects rather than to prevent them."¹ According to this new creed, the optimal amount of artificial light is said to be far in excess of that now prevailing in "a half seeing world,"¹⁵ and thanks to the researches of this science, the "deeply hidden effects of seeing which are unnecessarily wasting human resources are at last revealed."⁶

The foundation of this science of seeing is both philosophic and experimental. Philosophically, it is based on the assumptions that man evolved in sunlight and that the aim of artificial lighting should be to produce indoor illumination intensities "competing with daylight."⁷ Although the increase in lighting intensities necessary to produce these allegedly ideal conditions amounting to thousands of foot-candles are as yet impractical,⁸ the sponsors of these ideas advocate a compromise — one that, they assert, further technical advances in lighting may make temporary only. Needless to say, the recommendations of this science, even with the compromise allowance, have come as a considerable surprise to those familiar with man's ability to adapt himself to dark, and to those who are acquainted with previous reports showing that 10 foot-candles are adequate for ordinary purposes, and not more than 20 foot-candles for exceptionally fine work.^{9, 10}

The experimental data that, according to Luckiesh and Moss, have given rise to the "revolutionary"¹¹ concepts of the science of seeing are derived from two sources: first, from observations with the Luckiesh-Moss visibility meter, which allegedly indicates in foot-candles the intensity of light necessary for any visual task; and secondly, from a number of biologic changes that the authors claim to have correlated with ease of seeing.

The measurements with the visibility meter consist in interposing between observer and test object a variable filter. The test consists in resolving two vertical bars while the total illumination reaching the eye is varied by means of the filter.¹² Of course, the same result, so far as illumination is concerned, might be obtained simply by varying the intensity of light on the test object. The visibility meter, however, does something else: it introduces another variable through the progressively increasing scatter or fogging effect of the filter. To overcome this combined result of re-

duction in intensity and increase in fogging, the authors quite naturally find that high degrees of illumination on the test object are necessary. They are, in fact, led to conclude that intensities of 100 foot-candles are desirable for ordinary reading.^{13, 14} Wholly aside from the fact that the artificial conditions set up have no common counterpart in Nature, the authors have used visual acuity as a measure of visibility, a criterion that has been uniformly shown by many investigators, although not mentioned by Luckiesh and Moss, to reach a maximum at about 10 foot-candles.¹⁶ It is somewhat astonishing that these authors, who contend that it is "necessary to reveal the shortcomings of loose statements or dogmatic opinions,"¹⁶ should show such a patent disregard for the relevant though contradictory experiments of others. Because of the unnatural conditions set up by the visibility meter and because its recommendations are contradictory¹⁷ to almost all previous pertinent investigations, it cannot be accepted as a valid test without other convincing evidence.

The other source of experimental data that is said to prove the necessity of light intensities considerably in excess of present conditions is the alleged correlation of different illuminations for reading with certain biologic changes. Specifically, the authors state that reading under low illumination produces increased tension of the finger on a push button,¹⁸ increased size of pupil,¹⁹ slowing of heart,²⁰ decrease in amplitude of convergence,²¹ increased frequency of blinking,²² and more recently, changes in the rate of reading.²³ Some of the data have been misinterpreted by the authors,²⁴ and some have been contradicted by the work of others.²⁵ None of the experiments are above controversy, and all are done with the wide intensity variations of 1, 10 and 100 foot-candles, — in some experiments 0.1 and 10 foot-candles only were used, whereas in others only 1 and 100 foot-candles, — so that deductions concerning the intermediate intensities, which are the significant ones, of 5, 10, 20 and 40 foot-candles are invalid. The criteria of comfort and work output are, according to the authors, unreliable. Thus they dispose of the considerable amount of data of previous investigators that indicate that for all practical purposes light intensities of 10 foot-candles are adequate.^{9, 26-29}

Sweeping conclusions based on the above experiments form the substance of most of the literature that during the last fifteen years has inundated engineering, psychologic, industrial, medical and popular journals recommending ever-increasing illuminations. At the same time, a considerable number of reports, less accessible to the public perhaps, but nonetheless authoritative, have led

to the conclusion that 10 foot-candles is sufficient illumination.³⁰⁻³⁵ It is pointed out in these latter reports that visual acuity increases rapidly from 1 to 5 foot-candles, slowly from 5 to 10 and only slightly above 10. Certainly intensities greater than 20 foot-candles have no practical significance.¹⁵

But from the medical point of view the unfortunate part of this higher illumination campaign lies not alone in the fact that it is unjustified on the grounds of efficiency. What is worse is the implication that the illumination in the average home and office results in some organic harm to the eyes, and thus the public is cajoled into increasing the lighting for presumptive health reasons. That inadequate illumination results in damage to the eyes is rarely stated directly, although the literature cited above is rife with threats of "permanent injury,"³¹ "tragic toll"³⁶ and "decply hidden penalties"³⁷ that "can only be revealed by careful and unique scientific research,"³⁸ and with such suggestive illustrations as a blind man being led by a Seeing-Eye dog.³⁹ The responsibility of the medical profession is here obvious, but it is difficult for the average physician, who has neither the time nor the interest to review the literature, to keep his equanimity in the face of the abundant propaganda. There is no generally acceptable evidence that poor illumination results in organic harm to the eyes any more than that indistinct sounds damage the ears or faint smells damage the nose. To be sure, prolonged concentrations under inadequate seeing conditions, estimated at less than 3 foot-candles,³⁶ will result in fatigue. But the fatigue is one of attention, and the complaint is generally a headache. There is no evidence that this results in cataract, glaucoma, separated retina or any of the other organic diseases of the eyes. For years it has been suggested that the so-called "unhygienic" condition of poor illumination and much close work result in nearsightedness. Luckiesh accepts this unqualifiedly, and in presenting it to the public, proposes another etiologic agent: reading from glossy paper.¹⁹ There is no satisfactory evidence for the theory that nearsightedness is the result of much close work, poor illumination or reading print on glossy paper, whereas there is much evidence against it.⁴⁰ There is no proof that what is generally called "poor illumination" results in organic disease of the eyes.

It has been asserted that "the new science of lighting becomes a humanitarian movement which should engulf every human being,"⁴¹ but for those who have not taken their lighting seriously and who in consequence do not have one of the light meters, which Luckiesh augurs will be part of every well-equipped home,⁴² the following information may be of interest. A new 40-watt frosted

bulb will provide an illumination of 10 foot-candles at 23 inches, 15 at 19 inches, and 25 at 14 inches.⁴³ Although this seems adequate for normal purposes, a somewhat more intense illumination may be desirable in certain conditions such as in uncorrected presbyopia, in which the smaller pupil, induced by the brighter light, makes up in part for the lack of visual acuity from insufficient accommodation.⁴⁴ This, of course, is not necessary when suitable glasses are worn. But the important thing is not that light requirements vary in different people, which in itself might be held as sufficient evidence to invalidate a universal mechanical meter,⁴⁵ but that when a person, as a presbyope, is benefited by more illumination he instinctively turns on more light. And he does this without any knowledge of what is happening to his heart rate, pupil and so forth. Contrary to the contentions of Luckiesh and Moss, there is no valid reason for believing that man cannot judge the amount of illumination that gives him easy and comfortable seeing. There seems little justification for the analogy that just as man needs a thermometer for measuring temperature or a pair of scales for weighing a beefsteak,⁴⁶ he needs a mechanical device to tell him how easily he reads. Anyone who has had the limited experience of getting used to a hot bath knows how much more variable the sense of warmth is than a thermometer indicates. Similarly, it is the person, with all the variables that make up a human being, who is going to do the reading, not the meter.⁴⁶

EYESTRAIN

Most patients and some physicians believe eyestrain to be a well-defined entity, having specific causes, manifesting characteristic signs and symptoms, being readily detectable by objective examination, and leading to permanent damage of the eyes if untreated. To the ophthalmologist, on the other hand, eyestrain, although a convenient term, has less positive implications. "To the patient it has a definite and satisfying meaning, but to the doctor who employs it, it is almost if not quite meaningless, so that by its use he [the ophthalmologist] does not really commit himself in any way."⁴⁷ Here an attempt will be made to describe this ill-defined syndrome, to discuss some of its causes, and to suggest its physiologic background in the light of modern ophthalmologic thought. There is little doubt that the description to be given accords with the majority of ophthalmologic opinion, but the responsibility for the interpretation of the symptoms must, in view of the scarcity of literature on the subject, rest with me.

The chief symptoms and signs that make up

the syndrome of eyestrain are headache, sandy feeling and aching of the eyes, pulling sensation in and about the orbit, unusual sleepiness, and hyperemia of the globe and lids. None of these or of the many other symptoms that might be included in the syndrome are specific.

The alleged causes of eyestrain are legion, but refractive errors, muscle imbalances and faulty illumination have received most attention. Any visual task requiring concentration, especially when some extraneous influence makes this difficult, is potentially a source of eyestrain. It is not so much the refractive error or other handicap to vision that is responsible for the symptoms of eyestrain as it is the effort that is made to overcome the handicap. Whether or not glasses are indicated cannot be determined by knowledge of the refractive error and visual acuity alone. The effort that the patient exerts to overcome what handicap he may have must be taken into consideration. This is a very practical matter, and it is failure to take cognizance of it that has led to much unnecessary giving and changing of glasses, especially by nonprofessional refractionists. Persons with small refractive errors, especially low grade hyperopia and astigmatism, have severe symptoms of eyestrain, whereas those with errors so large that presumably no voluntary effort is made to correct them have no eyestrain. Indeed, the latter may have eyestrain only after wearing glasses for the first time. By the same token, persons with normal ocular mechanisms may on occasion have typical and genuine strain on using their eyes. The symptoms of eyestrain, thought to be due to errors of refraction but also occasionally present with no such error, are thus attributable not so much to the peripheral origin as to a central mechanism that attempts to correct for the defect. It is possible that this central mechanism may be invoked and may produce typical symptoms of strain without any change in the eyes themselves, thus attesting to the purely central origin of the discomfort. This is seen, for example, when an out-of-focus picture is projected on the screen. Here there is no question of accommodation, muscular imbalances and so forth, which does not apply to an in-focus picture, but it is distinctly less comfortable to view.

Although the evidence for the central origin of eyestrain from refractive errors would probably be accepted by most experienced refractionists, the symptoms arising from muscle imbalances or from exertion of the extraocular muscles are generally thought to arise in the muscles themselves. Certainly the discomfort feels as though it came from the region of the orbit. Further

more, fatigue of striated muscles elsewhere in the body is commonly believed to be due to accumulation of metabolic waste products and consequent stimulation of the nociceptors in the muscles. A number of observations, however, are apparently irreconcilable with this idea of the peripheral origin of discomfort in the eye muscles. A few may be cited. If a person maintains upward gaze for any length of time he feels a discomfort about the eyes that may culminate in a headache. But a person who, owing to a supranuclear lesion, cannot look up has the same symptoms merely from the continuous attempt to look upward. Here there is no muscle contraction or accumulation of metabolic waste products in the muscle tissue. Another striking example is afforded by nystagmus, in which condition the eyes are continually moved back and forth for hours without fatigue, whereas similar voluntary movements by a person with normal ocular motor mechanisms would be extremely fatiguing. There is thus a good argument for the hypothesis that eyestrain from muscular exertion is, like that from refractive errors, of central rather than peripheral origin.

The nature of the central process that I have called "visual effort" is far from clear, but it is known that such a process occurs and that it is not motivated solely by the eyes. The alpha rhythm from the occipital cortex, as detected with the electroencephalogram, may be abolished merely by the attempt to see in the dark just as it is in response to a peripheral visual stimulus.⁴⁸ An interesting case has also been recently reported in which a bruit over an occipital hemangioma was exaggerated by the attempt to see.⁴⁹ Both these observations are qualitative indications of some of the central processes taking place with visual effort. It is in such terms that eyestrain may eventually be explained.

What has been said of eyestrain from refractive errors and muscle disturbances probably applies to strain from other causes as well. It is an effort syndrome arising from the performance of a visual task, usually in the presence of some handicap, and it makes little difference whether the handicap is one of refractive error, glaring lights, distracting noises or difficult texts. Eyestrain is a central process related to concentration. The presence of some extraneous factor rendering the visual task difficult might be appropriately called mental glare, inasmuch as it consists in something other than the visual task imposing itself on consciousness. Instead of being a simple entity, eyestrain is thus a complex process extending well into the psychologic realm, and is certainly not amenable to evaluation merely by objective examination.

Granted the validity of this concept, it is apparent that although eyestrain may cause various psychologic disturbances,⁵⁰ it does not result in any organic disease of the eyes. Nor would one expect that organic ocular disease from whatever cause would be made worse by eyestrain any more than by other psychic annoyances. It is also apparent that the treatment of eyestrain is symptomatic only. Glasses are analogous to crutches, and important as their service is in this capacity, they have no further therapeutic value so far as the eyes are concerned. The common allegation that "wrong glasses" have ruined one's eyes is entirely without foundation. This concept of eyestrain also suggests the error in ascribing a medical implication to many of the maxims that have arisen from purely intuitive considerations. The reason that one should write with the light over one's left shoulder is that this arrangement makes the shadows least bothersome. The opposite holds for left-handed persons. As for reading, it makes no difference over which shoulder the light comes. Nor does any harm, other than perhaps discomfort, come from reading in bed. The same applies to reading on the train. Many of the misconceptions that have arisen as presumed health or sight precautions are clarified by an understanding of the psychologic nature of eyestrain.

* * *

Much pseudoscientific evidence pertaining to illumination and eyestrain has been generally accepted and enshrouded with medical implications. Unfortunately, the medical profession has concerned itself little with the problems arising from these beliefs. There is, for instance, little or no discussion of them in ophthalmic or medical texts. It is hoped, therefore, that this review will bring to the attention of those who are the final arbiters of public health a reasonable and critical judgment in these matters.

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REFERENCES

1. Luckiesh, M. and Pacini, A. J. *Light and Health*. 302 pp. Baltimore: Williams & Wilkins Co., 1926. P. 284.
2. Luckiesh, M. and Moss, F. K. The new science of lighting. *Proceedings of the Twenty-Eighth Annual Convention of the Illuminating Engineering Society*, Baltimore, October 1-4, 1934. Pp. 1-36.
3. *Idem*. Prescribing light and lighting. *Proceedings of the Thirtieth Annual Convention of the Illuminating Engineering Society*, Buffalo, August 31-September 3, 1936. Pp. 1-30.
4. Luckiesh and Moss.² P. 13.
5. *Idem*. *Seeing: A partnership of lighting and vision*. 267 pp. Baltimore: Williams & Wilkins Co., 1931.
6. Luckiesh, M. *Seeing and Human Welfare*. 193 pp. Baltimore: Williams & Wilkins Co., 1934. Preface.
7. Luckiesh and Moss.² P. 15.
8. Luckiesh, M. *Seeing*. 20 pp. Cleveland: General Electric Co. P. 16.
9. Atkins, E. W. The efficiency of the eye under different intensities of illuminations. *J. Comp. Psychol.* 7:1-37, 1927.
10. Weston, H. C. and Taylor, A. K. *The Relation between Illumination and Efficiency in Fine Work (Typesetting by Hand)*. 18 pp. London: His Majesty's Stationery Office, 1933.
11. Luckiesh.⁸ P. 17.
12. Luckiesh, M. and Moss, F. K. Visibility: its measurement and significance in seeing. *J. Franklin Inst.* 220:431-466, 1935.
13. Luckiesh and Moss.¹² P. 458.
14. Luckiesh.⁸ P. 9.
15. Tinker, M. A. Illumination intensities for reading. *Am. J. Ophth.* 18:1036-1039, 1935.
16. Luckiesh and Moss.² P. 29.
17. Ludvig, E. J. The gradient of retinal illumination and its practical significance. *Am. J. Ophth.* 20:260-265, 1937.
18. Luckiesh, M. and Moss, F. K. A correlation between illumination intensity and nervous muscular tension resulting from visual effort. *J. Exper. Psychol.* 16:540-555, 1933.
19. *Idem*. Size of pupil as a possible index of ocular fatigue. *Am. J. Ophth.* 16:393-396, 1933.
20. *Idem*. The effect of visual effort upon the heart rate. *J. Gen. Psychol.* 13:131-139, 1925.
21. *Idem*. The fatigue of convergence induced by reading as a function of illumination intensity. *Am. J. Ophth.* 18:319-323, 1935.
22. *Idem*. The eyelid reflex as a criterion of ocular fatigue. *J. Exper. Psychol.* 20:589-596, 1937.
23. *Idem*. Some effects of illumination on reading efficiency. *Tr. Illum. Engin. Soc.* 35:703-707, 1940.
24. Tinker, M. A. Cautions concerning illumination intensities used for reading. *Am. J. Ophth.* 12:43-51, 1935.
25. McFarland, R. A., Knehr, C. A. and Berens, C. Metabolism and pulse rate as related to reading under high and low levels of illumination. *J. Exper. Psychol.* 25:65-75, 1939.
26. Thompson, L. R., Schwartz, L., Ives, J. E. and Bryan, N. P. Studies in illumination. *Public Health Bulletin* No. 140. 118 pp. Washington: Government Printing Office, 1924.
27. Clark, J. H. *Lighting in Relation to Public Health*. 192 pp. Baltimore: Williams & Wilkins Co., 1924. P. 113.
28. Troland, L. T. An analysis of the literature concerning the dependency of the visual function upon illumination intensity. *Tr. Illum. Engin. Soc.* 26:107-196, 1931.
29. Weston, R. C. *The Relation between Illumination and Industrial Efficiency*. 1. *The Effect of Size of Work*. 14 pp. London: His Majesty's Stationery Office, 1935.
30. König, A. Die Abhängigkeit der Sehschärfe von der Beleuchtungsintensität. *Sitzungsab. d. Akad. d. Wissensch. in Wien*, 1897. Pp. 559-575.
31. Ferree, G. E. and Rand, G. The effect of variations in intensity of illumination on functions of importance to the working eye. *Tr. Illum. Engin. Soc.* 15:769-801, 1920.
32. Lythgoe, R. J. Illumination and visual capacities. No. 104, *Special Reports of the Medical Research Council*. 80 pp. London: His Majesty's Stationery Office, 1926.
33. Hecht, S. The relation between visual acuity and illumination. *J. Gen. Physiol.* 11:255-281, 1928.
34. Ferree, C. E. and Rand, G. Intensity of light in relation to near point and apparent range of accommodation. *Am. J. Ophth.* 18:307-318, 1935.
35. Tinker, M. A. Illumination and the hygiene of reading. *J. Educ. Psychol.* 25:669-680, 1934.
36. Luckiesh and Moss.¹² P. 432.
37. Luckiesh and Moss.² P. 3.
38. Luckiesh and Moss.² P. 6.
39. Luckiesh.⁸ P. 1.
40. Steiger, A. Die Entstehung der sphärischen Refraktionen des menschlichen Auges. *Klin. Monatsbl. f. Augenh.* 51: (No. 2):641-651, 1913.
41. Luckiesh and Moss.² P. 7.
42. Luckiesh.⁸ P. 5.
43. Tinker, M. A. Illumination standards for effective and comfortable vision. *J. Consult. Psychol.* 3:11-20, 1939.
44. Ferree, C. E., Rand, G. and Lewis, E. F. The effect of increase of intensity of light on the visual acuity of presbyopic and non-presbyopic eyes. *Tr. Illum. Engin. Soc.* 28:296-313, 1934.
45. Lancaster, W. B. Illumination levels and eye comfort conditions. *Sight-Saving Rev.* 8:163-173, 1938.
46. Luckiesh and Moss.² P. 6.
47. Verhoeff, F. H. Ophthalmology as a career. *J. A. M. A.* 101:649-652, 1933.
48. Davis, H. and Davis, P. A. The electrical activity of the brain: its relation to physiological states and to states of impaired consciousness. *A. Research Nerv. & Ment. Dis., Proc.* (1938) 19:50-80, 1939.
49. Fulton, J. F. Observations upon vascularity of human occipital lobe during visual activity. *Brain* 51:310-320, 1928.
50. Gould, G. M. *Biographic Clinics*. Vol. 5. 399 pp. Philadelphia: P. Blakiston's Son & Co., 1907.

CASE RECORDS OF THE
MASSACHUSETTS GENERAL HOSPITALANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

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CASE 27111

PRESENTATION OF CASE

First Admission. A sixty-one-year-old physician entered the hospital for study.

The patient was well until ten years previously, when he contracted lobar pneumonia; shortly afterward he developed a phlebitis in his right leg following a fall. During the next ten years he had six more attacks of phlebitis, four in the right leg and two in the left. At the end of this period he entered this hospital complaining of gas in his stomach occurring in the midafternoon and associated with nausea and belching, without vomiting. He had had these symptoms for two months and also complained of swelling and cramps in his legs, which he attributed to the old phlebitis. On examination at this time, the fundi showed slight nicking and tortuosity of the vessels, but the peripheral arteries were not palpable. The thyroid gland was slightly enlarged and appeared to contain several nodules. Examination of the heart was negative except for a soft systolic murmur at the apex; the blood pressure was 150 systolic, 84 diastolic. Examination of the urine and blood was negative. An electrocardiographic recording showed a normal rate and rhythm. The QRS₃ complex was of slightly low amplitude, with very slight slurring of QRS₂ and QRS₃. T₁, T₂ and T₃ were upright, and the chest lead was normal. X-ray studies of the sinuses, skull and gall bladder were negative; a gastrointestinal series showed multiple diverticula of the sigmoid.

Second Admission (three years later). The patient carried on for the next two and a half years, at the end of which he presented his physician with an electrocardiogram taken in California two months previously following an attack of pain said to be typical of coronary thrombosis. This recording was distinctly abnormal and was interpreted as being more in keeping with a basal infarct, including partial auriculoventricular block, than with an acute cor pulmonale from pulmonary embolism. His physician found moderate pitting edema of both legs from chronic varicosities. There was a very slight aortic systolic murmur, but the heart seemed normal in size, sounds, rate and rhythm; the blood pressure was normal.

An electrocardiogram was now essentially normal, with slight inversion of Lead 3. Fluoroscopic examination showed a full-sized heart with normal aorta and clear lungs. Six months later, the patient returned to his physician merely for the purpose of a routine check-up; fluoroscopic examination showed a large shadow in the middle of the right lung. The temperature, heart, and electrocardiogram were normal. An x-ray film of the chest taken the next day showed the diaphragm to be normal in outline, position and excursion. The right lower and middle lobes and the base of the right upper lobe contained multiple sharply defined areas of consolidation. These areas were in contact with the pleural surfaces and moved normally with the lung. There were at least seven separate areas of density. The right lower and middle lobes were probably reduced in size, the lower more so than the middle. The septum between the lower and upper lobes was convex downward and posteriorly. The largest areas of consolidation were in the superior margin of the middle lobe and in the apex of the lower lobe. There was no evidence of fluid. The mediastinum was moderately displaced to the right. The apex of the heart was sharp and pointed, suggestive of a small, sharply defined area of consolidation in the adjacent lung. The left lung and upper portion of the right were otherwise clear. The aorta was normal. Three days after this examination, the patient had a flare-up of his phlebitis in the right leg and was admitted to the hospital.

The right saphenous and femoral veins were divided. An uneventful convalescence followed, but one month later the patient noticed that he was slightly dyspneic and complained of pain in the right mid-chest anteriorly. X-ray examination of the chest showed what the roentgenologist interpreted as fresh pulmonary infarcts. The right common iliac vein and the hypogastric vein and artery were sectioned. Following this procedure, the patient developed a rise in temperature, with signs of consolidation in the right middle chest, and Type 3 pneumococci were isolated from the sputum. He was given sulfapyridine with apparent improvement, but continued to run a swinging temperature up to 101°F., the pulse running between 90 and 100, the respirations around 30. Approximately one month after the operation a blood culture grew an unidentifiable pneumococcus. The additional and relevant physical findings at this time were as follows: The chest showed limitation of motion on the right side anteriorly and posteriorly, and there was dullness to percussion from the second to the sixth rib

on the right anteriorly. The breath sounds were slightly diminished throughout the right chest anteriorly. Posteriorly on the right there was dullness from the sixth spinous process to the ninth, where percussion elicited slight tenderness. Tactile fremitus was absent at the right base, and the breath sounds were diminished progressively from the sixth spinous process down, becoming absent below the ninth. Examination of the heart was unchanged. The extremities showed edema, with marked pigmentation over the anterior surface of the shins. Over the next ten days the chest signs improved so that at the time of discharge there was a definite increase in resonance both anteriorly and posteriorly on the right, with less suppression of breath sounds over the involved areas. A positive blood culture was not obtained again.

Third Admission (four months later). The patient returned to the hospital for a check-up and because of pain in the right lower leg and foot of one month's duration. The pain had started in the big toe, and gradually extended to include the lower leg. It was worse at night and during rest, and was relieved by walking. The patient was a little dyspneic on exertion. Examination of the chest showed limited expansion on the right, with dullness, diminished breath sounds and coarse wheezes on this side. The right toes and foot became red when in the dependent position and blanched promptly on elevation. There were varicosities around the ankle, with slight edema, and tenderness was present over the dorsum of the right foot and lower leg, with limitation in dorsiflexion at the ankle. Pulsation was good, and there were no obvious temperature differences. Examination of the urine and blood was negative; the sedimentation rate was normal. The nonprotein nitrogen of the blood serum was 22 mg. and the uric acid 5.1 mg. per 100 cc. An electrocardiogram was within normal limits. X-ray study of the chest showed that the large area of density in the right middle lung field had now completely disappeared, leaving only a few linear bands of density extending laterally and downward from the hilus. The diaphragm was irregular in outline and limited in excursion. The left lung was clear, and the heart shadow slightly displaced to the right. The heart showed slight prominence in the region of the left ventricle. There was no evidence of fluid or active disease. X-ray films of the legs were essentially negative. The patient was discharged three days later with a diagnosis of peripheral neuritis.

Fourth Admission (thirteen months later). Eight months before this admission, the patient had developed a cold that went to his trachea, with the

result that he had difficulty with wheezing respirations, and from time to time a little "asthmatic breathing." An x-ray film taken five months before entry showed a high right diaphragm, with numerous thin lines at the site of the large areas of consolidation described on previous examinations. There were no remaining areas of consolidation and no new lesions. Three weeks before admission the patient became short of breath on exertion, and, in addition, had attacks of nocturnal dyspnea during which he was compelled to sit upright, although, in general, lying flat gave no trouble. This dyspnea was accompanied by a tiring, brassy cough productive of a little white frothy sputum and a heavy feeling in the chest under the sternum. The onset of these symptoms was not sudden, nor was there pain.

On examination, the patient was cyanotic, with some increase in respiratory rate, and a slight respiratory crow was audible. Examination of the heart was negative except for slight displacement to the right; the blood pressure was 130 systolic, 82 diastolic. The right chest was retracted, and posteriorly at the base the percussion note was dull and the breath sounds, vocal and tactile fremitus absent. The liver was palpable two finger-breadths below the costal margin on deep inspiration. Examination of the urine and blood was negative; the red-cell count was 5,450,000, the sedimentation rate normal, and the vital capacity of the lungs 1741 cc. An electrocardiogram was within normal limits. X-ray examination of the chest showed the diaphragm to be obscured by a homogeneous density, which shifted when the position of the patient changed. There was consolidation at the apex of the right lower lobe and in the region of the anterior portion of the right middle lobe. The heart was to the right of the spine, without shift of the mediastinum. The right side of the diaphragm moved very little. The left lung was clear except for slightly diminished radiance at the base. X-ray study of the gastrointestinal tract showed the esophagus, stomach and duodenum to be essentially normal. The esophagus was deviated toward the left at the lower third. The right chest was tapped on two occasions, but only once was fluid obtained, and then but 3 cc. were withdrawn. This fluid contained 2250 red cells, 6600 lymphocytes, and 400 polymorphonuclears per cubic millimeter. No tumor cells were identified by the pathologist. The patient continued to crow and wheeze on respiration, the sounds being heard over the superior mediastinum and remaining audible in whatever position he assumed. Examination of the trachea and vocal cords was negative. The patient was discharged on the ninth hospital day.

Final Admission (three weeks later). In the interval, the dyspnea, asthmatic breathing and cough with slight sputum had persisted, and had indeed become slightly more pronounced. Two weeks before admission the patient began to suffer from profuse sweating and periods of chilliness without fever. A blood examination was said to have shown malarial parasites, and he was given a course of atabrin (15 tablets). This was followed by a diminution in size of the "right lobe of the liver," but did not change the clinical course. Eight days before admission, he developed in the lower chest a sudden pain, which was not associated with an increase in dyspnea. This pain lasted four days and was relieved promptly by manipulation of the vertebrae. However, at this time he complained of a sudden right epigastric pain associated with nausea and relieved by "Ludozan." Subsequently any solid food initiated this pain, which was accompanied by extreme localized tenderness. On one occasion, two days before admission, the patient raised a small amount of blood-streaked sputum. With the increase in dyspnea there was some orthopnea, and the pulse became intermittent at 90; the blood pressure was 110 systolic, 70 diastolic. The patient was given 0.5 cc. of digalen, which lessened the right-upper-quadrant abdominal tenderness and cleared the rales heard in the chest. The pulse became regular at 84.

On examination the patient showed striking evidence of weight loss. He was dyspneic, with a rasping, asthmatic wheezing precipitated by any movement. He coughed frequently, producing a thick mucopurulent sputum. There was slight cyanosis, but no obvious venous engorgement of the neck veins. The trachea was displaced to the right. The right chest was flat with limited expansion, and there was dullness to percussion from the third interspace down, with diminished breath sounds. Posteriorly on the right there was a dull to flat percussion note from the lower scapular region down, with absent breath sounds and tactile fremitus. Slight hyper-resonance was present at the right base. The heart was displaced to the right, and a rough systolic murmur was heard along the left sternal border. The pulmonary second sound was slightly greater than the aortic second, the rhythm was regular, the blood pressure 122 systolic, 65 diastolic. Examination of the abdomen revealed tenderness 5 cm. below the xiphoid and slightly to the right. The liver margin was palpable 4 cm. below the costal margin in the mid-clavicular line and was diffusely tender. Peripheral edema was absent; the right leg was somewhat larger than the left, but was not tender.

No pulsation could be felt in the right dorsalis pedis artery, but it was present on the left.

The temperature was normal, the pulse 98, and the respirations 35.

Examination of the urine showed a + test for albumin. Examination of the blood showed a red-cell count of 4,410,000 with a hemoglobin of 15.1 gm. (photoelectric-cell technic), and a white-cell count of 9500. The nonprotein nitrogen of the blood serum was 19 mg., the serum protein 6.1 gm., the calcium 11.1 gm., the phosphorus 3.9 mg. per 100 cc., and the chlorides were 97.8 milliequiv. per liter. The sedimentation rate was normal. Examination of the stools showed a + guaiac test.

X-ray films of the chest showed very little, if any, change in appearance since the last observation. There was definite evidence of fluid and an extensive destructive process in the right lung. The left lung appeared normal.

On x-ray study of the abdomen, the outline of the diaphragm was not visible on the right side, and there was dullness extending a little below the twelfth rib. The kidney on this side was easily seen, appeared normal in size and shape and was apparently displaced downward so that its lower pole overlay the crest of the ilium. The shadow above it was of homogeneous density and was possibly due to an enlarged liver. There was no abnormal shadow on the left side. There was a moderate amount of gas in the colon and small bowel. The spine showed hypertrophic changes.

An electrocardiographic recording showed a normal rhythm with a rate of 100. T₁ was low and slightly diphasic. S-T₂ was sagging with slight late inversion. T₃ was inverted, R₁ upright and T₄ inverted (for the most part, late).

The patient never improved, continued to complain of severe attacks of epigastric pain and was weak, slightly cyanotic and dyspneic, with a troublesome cough. Four days after admission he again raised rusty sputum and continued to do so thereafter; the white-cell count was 15,800. He was placed in an oxygen tent, given diuretics and heparin. On the thirteenth hospital day the patient passed a tarry stool, and for ten days thereafter the stools were guaiac positive. The temperature was now 101°F. At this time the right elbow became painful on any motion and the left forearm and hand slightly swollen; edema of the feet developed, more marked on the left, with tenderness in the inner right mid-calf. Latterly the patient became disorientated, peripheral edema increased, the liver grew larger and tenderer, and the temperature rose to 102°F. Death occurred on the thirty-seventh hospital day.

DIFFERENTIAL DIAGNOSIS

DR. WILLIAM B. BREED: Ten years before the final admission this patient came in complaining of gas in the stomach with nausea and belching, but no vomiting. The x-ray films showed merely diverticula of the colon. The electrocardiogram showed nothing specific, merely slurring of the QRS₂ and QRS₃. The patient was then apparently discharged from the hospital with no diagnosis. Certainly no one found out why he was having indigestion.

Three years later, at the age of sixty-four, he returned to the hospital with the story that he had had pain in the chest, and produced electrocardiograms that had been interpreted by somebody as representing basal infarction with partial auriculo-ventricular block. The heart at this admission, however, was entirely normal, and another electrocardiogram showed only slight inversion of T₃, which means nothing. I should like to know who interpreted the other electrocardiogram and whether or not we can safely say that the patient had had a basal infarction of his heart. I am inclined to doubt it. He had a flare-up of phlebitis during this admission and was operated on, the right saphenous and femoral veins being sectioned. Obvious pulmonary infarction was found by x-ray examination. Then the common left iliac vein and artery were sectioned. This was followed by signs of consolidation in the right chest, the sputum containing Type 3 pneumococci. At that time an unidentified pneumococcus was recovered from the blood; then the chest cleared, I assume, and the patient went home.

About four months later he had pain in the right lower leg and foot for one month; it was worse when resting and relieved while walking. There were varicosities about the ankle. An electrocardiogram was reported at that time as normal, and the blood chemical findings were perfectly good. The patient had no renal difficulty. The x-ray studies at that admission should be of interest. He was discharged then with the diagnosis of peripheral neuritis, which I am inclined to doubt. Thirteen months later, he returned to the hospital with the story that eight months previously he had had a cold, which had gone to his trachea, and that he had been having asthmatic breathing on and off ever since that time. Additional x-ray films showed numerous lines at the site of the mass, which had disappeared. Three weeks previously, the patient had had attacks of nocturnal dyspnea associated with brassy cough and a heavy feeling under the sternum, but no pain. At this time he was cyanotic, and the heart was displaced to the right.

At the fourth admission, the chest was tapped, and 3 cm. of fluid was withdrawn, which showed 2250 red cells and 6600 leukocytes with 400 polymorphonuclears, and which certainly was not just blood and must indicate either inflammation or some malignant process. No tumor cells were identified by the pathologist. I think it would be of value to try to get some order out of this chaos by taking up the various systems, discussing first the one that is least likely to cause this trouble. That, I believe, is the metabolism, as reflected in the chemical examinations. The phosphorus is all right, the nonprotein nitrogen is normal; the calcium is 11.1 mg. per 100 cc., which is very slightly above the high normal of 10.8. With that single finding I cannot go any farther, but I do not see that it is of any significance.

I think the next group of symptoms or signs I should like to take up would be those pertaining to the cardiovascular system. It seems to me very unlikely that this man had had a basal infarction and then had a return of the electrocardiogram and other findings to normal. My experience is that younger people with infarction have a return to a normal electrocardiogram more frequently than people over sixty. It is not often that the signs of infarction disappear in a man of this age. Therefore, I am doubtful about this coronary occlusion. The cardiac situation does not seem to me to be very prominent. The patient had a fall in blood pressure, and toward the end probably did have congestive failure, but I do not believe that he suffered any accident to his coronary arteries.

The pulmonary situation in the first part of the illness is quite simple. The patient had phlebitis and recurring pulmonary infarction, which we know about; and up to the latter part of the illness the pulmonary situation seems quite clear. The x-ray films showed definite clearing of the initial lesions. Then latterly he developed again a definite pathologic process in the right chest, which caused pulling of the heart to the right, indicating a collapse of the middle lobe and perhaps the right lower lobe. I believe that this was some destructive process in the right lung and was the main cause of his death.

I should like to have Dr. Hampton interpret the x-ray films.

DR. AUBREY O. HAMPTON: I looked over these films carefully. The patient had many examinations and many films. These are the most interesting. If you want to know anything about the others, I have them here. At the first examination there were multiple, sharply defined areas of consolidation in the right middle and lower

lobes. They corresponded to the margins of these lobes and had the general shape and appearance of infarcts. There was no pleural reaction, however. Here on the left side is a short linear shadow continuous with a v-shaped configuration of the apex of the heart, which we thought was a healed infarct and which, perhaps, was related to the cardiac episode. The patient might have had precordial pain and cardiac embarrassment with it. One month later this picture in the chest had not changed. Another film taken twenty-three days later, following the first operation, showed obliteration of the previously clear costophrenic angles. If one compares the lateral views, the shadow of the heart is covered by new sharply defined masses, so that we may assume that there were two more infarcts following the first operation. At that time the patient said, "I have finally had the pain you have been trying to get me to admit." Nearly two and a half months later, following the second operation, this film—one of the many films at this time—showed pleural effusion and reduction in size of the masses in the right lung. Four months after that all the lesions in the lung had practically disappeared, leaving numerous lines similar to the one noted at the left border of the heart, so that we then assumed that the infarcts had healed.

DR. BREED: So far we are even.

DR. HAMPTON: These are the films of the last admission. There is now a change in the whole picture. The patient came in with about the same evidence of pleural disease that he had following the second operation. There are also masses in the right mid-lung field, and in addition a circular area of diminished density, which looks like a cavity. The trachea, heart and mediastinum have all shifted a little farther to the right. We examined the esophagus and trachea, trying to discover the cause of the discomfort and wheezing, but could find very little wrong, only a little esophageal displacement where it crossed the aorta. The stomach was normal, and the shadow of what we thought was his liver was large. The kidney was displaced downward. The spleen was not enlarged so far as we could tell. This final film was taken one month later, and shows numerous, irregular cavities in the region of the middle and lower lobes. Of course the heart would shift to the right if the lung were destroyed.

DR. BREED: I think it is reasonably clear that this patient had a serious chronic condition in the right lung. Whether it was due to primary cancer in the bronchus or to a primary destructive lesion farther down, or whether it was metastatic cancer or multiple abscesses in the collapsed

lung, I am sure I have not yet a clear idea, but I am reasonably certain that this man died of pulmonary disease primarily. We then come to the question of tarry stools, and this very peculiar complaint of tenderness and pain in the same spot when he swallowed food. Is that a good description of what he really showed? You will admit that it is a peculiar symptom.

DR. TRACY B. MALLORY: Can you answer that, Dr. Stetson?

DR. RICHARD P. STETSON: After eating, the patient had spontaneous pain, which he localized in the right epigastrium, and there was a spot of persistent tenderness just to the right of the mid-line.

DR. BREED: Let us consider the gastrointestinal tract. When he first came in, the complaint was indigestion, and nothing more is said about the tract throughout the whole long illness up to the point of this situation toward the end. It seems a far cry but it is possible, I suppose, that he had some cancer in his gall bladder, with metastases to the lung, and possibly later erosion of the esophagus or some other portion of the gastrointestinal tract, with the production of tarry stools. I cannot believe that he died suddenly from hemorrhage, although he did have this large tarry stool. Though the intestinal tract may have been secondarily involved, I do not believe it was a primary feature of the disease. I think that the patient died of cancer primarily in his chest, which may have been complicated by multiple abscesses behind an obstructed bronchus. Although he probably had some terminal heart failure, I doubt if this man had an occlusion of an artery in his heart.

DR. MALLORY: I should be glad to have you cross-examine any of the expert witnesses. They are nearly all present—Dr. White, Dr. Faxon, and Dr. Stetson.

DR. BREED: Dr. White, you are first. You were satisfied that this patient had had a basal infarct?

DR. PAUL D. WHITE: I was the first of the chain, and then was less in touch with him as the heart began to fade from the picture. I saw him first in May, 1938. He had come back from California with the story and electrocardiogram typical of something happening suddenly in the chest. The electrocardiogram showed auriculoventricular block and deformity of Q and T (prominent Q's and inverted T's) in the second and third leads. The auriculoventricular block seemed to indicate not an acute cor pulmonale but basal myocardial infarction in all probability. We had never encountered heart block before in acute dilatation secondary to pulmonary embolism. My first diag-

nosis was therefore coronary thrombosis in May, 1938, and phlebitis of twelve years' duration. I checked up six months later, when he felt perfectly well, but I was amazed at that time to find a large shadow in the right lung. I sent him then to Dr. Hampton. You have heard the rest of the story from him.

DR. BREED: Were you surprised to see the heart and electrocardiogram return to normal?

DR. WHITE: No, that happens occasionally with basal myocardial infarction, so that despite the fact that the electrocardiogram was normal in May and again in December, I did not change my original diagnosis but added that of pulmonary infarction.

DR. DONALD S. KING: Could it all be the result of septic infarction in that area?

DR. BREED: With multiple abscesses? I suppose it could. I do not know how one can explain the tarry stool and positive guaiac tests on that basis.

To go back to the heart: The last electrocardiogram was perfectly consistent with digitalis effect or with, perhaps, some coronary disease, but I cannot interpret it as coronary occlusion. Of course, the patient may have had one after the last electrocardiogram, but there is nothing in the history to indicate it.

DR. WHITE: I think your reasoning is excellent.

DR. BREED: It may be excellent, but I do not think it is going to produce anything brilliant here. I have committed myself to cancer, either primary or secondary in the right chest. I should be inclined to think it was primary and not secondary.

DR. GEORGE W. HOLMES: One of the things that has bothered Dr. Breed is this intestinal hemorrhage. I should like to suggest the possibility of embolus to the mesenteric arteries.

DR. BREED: I did consider it, but there was nothing in the story to indicate its presence. The patient lived for ten days after the positive guaiac, and nothing was said about an acute abdominal situation. I hate to surrender the explanation of this tarry stool but I have not a thought, except erosion of the gastrointestinal tract by cancer.

DR. KING: If you saw the last x-ray films and did not know the story, what diagnosis should you make, Dr. Hampton?

DR. HAMPTON: I should have to say primary carcinoma of the lung with metastases to the liver.

DR. KING: If you saw the x-ray films alone, you could not escape that diagnosis, but I do not know whether it is a good one.

DR. BREED: I am willing to make that diag-

nosis, but I am not going to say metastasis to the liver.

DR. HAMPTON: How are you going to account for the large shadow in the right upper abdomen?

DR. BREED: By his congestive failure.

DR. HAMPTON: His spleen is not enlarged.

DR. BREED: Well, what of it?

DR. HAMPTON: That is a very big liver, if it is the liver. I am not sure that it is.

DR. BREED: If you do not know, I should not be expected to, and these men will not tell me; I therefore do not think they knew either.

CLINICAL DIAGNOSES

Pulmonary infarction.

Bronchopneumonia.

DR. BREED'S DIAGNOSES

Cancer of the lung, ? type.

Erosion of gastrointestinal tract, ? site.

Phlebitis.

Pulmonary infarction (old).

ANATOMIC DIAGNOSES

Reticulum-cell sarcoma involving right lung, pleura, stomach, retroperitoneal tissues, mediastinum and trachea.

Thrombosis of inferior vena cava, common iliac, femoral and deep veins of legs, bilateral.

Arteriosclerosis, slight, aortic and coronary.

Cholelithiasis and choledocholithiasis.

Stricture of left ureter.

Hydronephrosis.

PATHOLOGICAL DISCUSSION

DR. MALLORY: To start with the negative findings: The heart was small, the coronary arteries capacious, and there was no significant amount of coronary sclerosis. On the positive side, this man was riddled with tumor. The largest amounts of tumor were in the right thoracic cavity, partly in the form of massive pleural involvement but also as a complete neoplastic replacement of the right lower and middle lobes. In the midst of the tumor were many small cystic cavities where the tumor had broken down. The liver was normal in size, small,—weighing 1500 gm.,—and the mass that had been felt and interpreted on x-ray examination as liver was an immense mass of tumor in the gastrocolic ligament, which ran backward and was continuous with more tumor, chiefly centering in the nodes around the head of the pancreas and also destroying the pancreas itself. A peculiar finding was that all the mesenteric tabs in the sigmoid were infiltrated with

neoplasm. A significant amount in the posterior mediastinum had invaded through the trachea at one point, and a small tumor mass was present within the trachea. I therefore think that the wheezing and the asthmatic breathing were due both to intrinsic and to extrinsic narrowing of the air passages.

The probable source of the tarry stool was the stomach, which presented a most extraordinary appearance of about 50 separate small tumors in the mucosa, most of them with shallow ulcerations. The widespread distribution of the tumor masses and the lack of obvious primary focus suggested some form of lymphoma, and on microscopic examination we finally classified this as a reticulum-cell sarcoma. We were able to find in the left lung one linear scar, which Dr. Hampton pointed out on first entry and which I think represented a healed infarct. All evidence of the multiple infarcts that Dr. Hampton had described in the right lower lobe was entirely obliterated by the neoplastic growth. Despite the various venous ligations that this man had had, he still had a source for pulmonary emboli, since the thrombotic process extended well up into the vena cava. Incidental findings, which probably played no role in his symptomatology, were a stone in the common duct and a stricture of the left ureter, with a secondary hydronephrosis.

Dr. HENRY H. FAXON: The operation was done at another hospital, and was attended, I am told, with a certain amount of difficulty. I believe that bleeding was encountered and prompted the surgeon to ligate the artery as well as the vein. The only other reason that could be advanced for sectioning the artery would be its alleged beneficial vasomotor effect on the deep phlebitis. Dr. John Homans, I believe, considers that in such cases section of an artery will be helpful, but I should be opposed to carrying out this procedure. I believe that lumbar sympathectomy or injection would be more satisfactory if the purpose were to secure distal vasodilation.

Dr. WHITE: May I add one word about the electrocardiogram? During the last few years, I have occasionally found it difficult to tell the difference by electrocardiography between basal myocardial infarction and acute dilatation of the heart secondary to pulmonary embolism. As it turned out, there must have been that confusion here even to the point of believing that this patient had transient heart block with pulmonary embolism. Why that happened, I do not know, unless asphyxia could have been responsible, as has been proved in animal experiments. The terminal

electrocardiographic changes could be explained by the serious final illness.

CASE 27112

PRESENTATION OF CASE

A twenty-year-old girl entered the hospital complaining of pain and swelling in the right ankle.

The patient stated that seven months before admission, while she was walking, a sudden pain developed in her right ankle and was severe enough to initiate slight nausea. This was followed by swelling, fever and an area of redness on the outer surface of the ankle. These symptoms lasted for two weeks, then subsided, but three weeks later a similar episode occurred, apparently quite spontaneously. During the months before admission, the patient suffered six such attacks, and each time the symptoms gradually subsided, except for the persistence of slight swelling. Between times there was no pain, no inconvenience, but occasionally a slight twinge occurred in the ankle when she stepped in a certain way. Four days before admission, she happened to brush her ankle against a chair and there was pain, followed in several hours by swelling and tenderness. The pain increased, disturbing sleep, although somewhat relieved by elevating the part. She had not lost weight.

On examination the patient was well developed and well nourished and in no apparent distress. Examination of the heart, lungs and abdomen was negative; the blood pressure was 120 systolic, 80 diastolic. Over the right external malleolus there was a localized area of nonfluctuant swelling and redness, with a slight increase in surface temperature. Tenderness was present maximally at the lower end of the malleolus below the point where swelling was most marked. Active and passive movements of the joint were not painful or limited. No other joints were involved, and the regional lymph nodes were not swollen or tender.

The temperature, pulse and respirations were normal.

Examination of the urine showed a + test for albumin. Examination of the blood showed a red-cell count of 4,520,000 with a hemoglobin of 75 per cent, and a white-cell count of 12,100 with a normal differential. The sedimentation rate was normal. The serum calcium was 10.9 mg., the phosphorus 3.5 mg. and the protein 6.7 gm. per 100 cc., with the phosphatase 2.9 units. A blood Hinton test was negative, and agglutination reactions for *Eberthella typhosa*, *Salmonella paratyphi*, *S. schottmülleri* and *Brucella abortus* were negative.

Tuberculin tests were negative in dilutions of 1:10,000, 1:1000 and 1:100.

X-ray films of the right ankle showed that the distal 2.5 cm. of the right fibula was deformed into a multilocular cavity with coarse irregular trabeculation. The external malleolus was not involved, but the cavity probably reached the joint surface medially. The borders of the cavity were rather ill defined, and there was a fracture through its posterolateral wall, with periosteal new-bone formation in this area. A fairly marked diffuse soft-tissue swelling was present on the outer aspect of the leg.

X-ray studies of the chest, skull, bones of the forearms, wrists, humeri, lumbar spine and pelvis were negative.

On the seventh hospital day a biopsy was performed.

DIFFERENTIAL DIAGNOSIS

DR. RICHARD H. WALLACE: We have an apparently otherwise healthy young girl with a lesion in the lower end of the fibula, which has produced symptoms for seven months, and I believe that the first question we must try to decide is whether or not this can be an inflammatory lesion. There is nothing in the history to suggest a previous infection. The temperature, pulse and respirations are reported as normal. The patient had a slightly elevated white-cell count with a normal differential. A story of this duration with intermittent symptoms, chiefly pain, not only with activity but also with rest, is fairly unusual for infection. In addition, agglutination tests for one thing and another were negative. Although I believe it is possible, I think it is unlikely that she had infection. One other point in regard to infection: the initial onset of trouble was pain while walking. In view of the subsequent demonstration of a fracture line in the x-ray films, it seems possible that the initial symptom might have been the result of a pathologic fracture, which would be extremely unusual for the first symptom of osteomyelitis. Just in passing, I might say that it is extremely unlikely that this is either syphilis or tuberculosis.

We always have to consider parathyroid disease in any bone lesion. The calcium, phosphorus and phosphatase do not suggest parathyroid disease. It is certainly not simple cyst from the x-ray appearance, and the position in the bone is unusual, because simple cysts occur more toward the center of the shaft.

Benign tumor might be considered next. Giant-cell tumor can be ruled out because of the x-ray appearance and the fact that giant-cell tumor is

usually confined to the epiphysis. This might conceivably be a chondroma, or, more likely, even an angioma of some sort.

This motheaten appearance suggests multiple myeloma, which with this duration should give involvement of bone somewhere else, and, again, the patient after this length of time probably would not be healthy in appearance. It could conceivably be lymphoma or something in the lymphoma series; reticulum-cell sarcoma is the likeliest possibility. Metastatic disease would have to be considered. It is not the usual appearance of the bone destruction that we see in metastatic disease. There is some new-bone formation here. Whether that is due to the old fracture or not is difficult to say. Osteogenic sarcoma is certainly a possibility. There is no great elevation of the periosteum, as we usually see in osteogenic sarcoma, and no ray formation, but osteogenic sarcoma frequently occurs without that.

Perhaps Dr. Holmes will help us at this point.

DR. GEORGE W. HOLMES: I think I know the diagnosis in this case. I have seen it before. Of course, in the lower end of the fibula there is an obvious lesion, which is almost wholly destructive and which occupies a considerable portion of the bone, but it does not look like an inflammatory lesion.

Then we come to tumor — whether it is benign or malignant. It is apparently a rather vascular tumor, and the only benign tumor that could possibly resemble it is an angioma, which, of course, is rare. The chances are in favor of primary malignant tumor.

DR. WALLACE: Should you say that there is a fracture through the lower end of the fibula, with new-bone formation at this site associated with it?

DR. HOLMES: It is not very obvious, but I think that there is one. If there is a fracture there, that makes it more difficult to interpret the significance of any periosteal proliferation.

DR. GRANTLEY W. TAYLOR: What are the characteristics that justify your saying that it is a highly vascular tumor? What are the x-ray characteristics?

DR. HOLMES: There is a good deal of bone absorption without bone proliferation. I have no very good grounds for my statement when you pin me down, but a vascular tumor shows a lot of bone destruction without much proliferation as a rule. There are trabeculae, moreover, throughout this tumor, whereas if it were a fibroma, or a fibrosarcoma one would expect destruction of all the bone. This apparently spreads irregularly

through the bone, leaving trabeculations, a thing that the vascular tumors are likely to do.

DR. WALLACE: Should you say that the periosteum is elevated to any great extent?

DR. HOLMES: There is some elevation.

DR. WALLACE: It comes down to the question of whether or not this is osteogenic sarcoma. The local signs are in keeping with that diagnosis—the redness and increased heat locally. The pic-

any given reading. One other point about Ewing's tumors is that they are less likely to have new-bone formation. The onion-skin appearance in the region of the periosteum that we frequently see in Ewing's sarcoma is not present here. However, we have seen this appearance in osteogenic sarcoma and the ray formation commonly associated with osteogenic sarcoma in Ewing's tumor. I believe, with all the evidence at hand, that a final conclusion could be reached only by biopsy, but I shall say that I consider the likeliest diagnosis to be Ewing's tumor.

DR. CHANNING C. SIMMONS: Like Dr. Holmes, I do not know that I am qualified to discuss this case, for I saw it clinically. I made the correct diagnosis, not on the evidence submitted, but because I had seen a similar case some time before. In all cases of bone disease, one has to consider four general possibilities: generalized bone disease, metastatic tumor, an inflammatory condition and primary bone tumor, either benign or malignant. In this case, with the data we have, metastatic tumor and generalized bone disease may be ruled out, which brings us down to an inflammatory condition or tumor. The patient had pain and evidence of tumor in the area for some time, with redness. I do not know whether or not she ever had a temperature, but she had none on admission to the hospital. On examination, however, she had a slightly elevated white-cell count, which might be due either to inflammation or to bone tumor, for a malignant tumor occasionally gives an elevated temperature and white-cell count. From the story she obviously had had trouble with the ankle for some time, followed by an acute attack of pain probably owing to the crack and tear through the periosteum. Of the inflammatory conditions we have to consider syphilis, tuberculosis and osteomyelitis. The blood Hinton test was negative. I do not think it is tuberculosis, for the x-ray film does not look like it. Osteomyelitis is a definite possibility. The benign bone tumors, with very few exceptions, cause no pain. The exception is giant-cell tumor and sometimes a central osteoma. I have never seen a central osteoma, but they are said to be painful. This patient had a bone-destructive lesion, demonstrable by x-ray, and a normal temperature. I believe that it undoubtedly is a malignant tumor of some form, either osteogenic sarcoma or Ewing's sarcoma. In giant-cell tumor with bone destruction, the destruction is usually very sharply marked at the top, with a sharp angle at the periosteum, and extends to the joint cartilage. Ewing's sarcoma is rare in this situation. It usually is in the shaft, but can



FIGURE 1.

ture is a little confused by the fracture. One ordinarily would expect a little more new-bone formation with osteogenic sarcoma of seven months' duration.

A likely possibility is, I believe, a Ewing's sarcoma, which can and occasionally does occur in this position in bone. The story of intermittent pain and local signs is common in Ewing's tumor. Early fracture is not unusual in weight-bearing bones. The slightly elevated white-cell count, with the normal differential, is in keeping with Ewing's tumor. I might say that, so far as bone tumors are concerned, elevation of the phosphatase is associated with new-bone formation. Of course, the reading is normal in this case, but in osteogenic sarcoma the readings vary from time to time, so that it is not necessarily elevated at

occur in any situation. I believe that this is probably a Ewing's sarcoma, but think it is impossible to make a diagnosis without a biopsy.

CLINICAL DIAGNOSIS

Benign giant-cell tumor of fibula.

DR. WALLACE'S DIAGNOSIS

Ewing's tumor.

ANATOMIC DIAGNOSIS

Ewing's tumor.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: A biopsy was performed on this patient, and a diagnosis of Ewing's tumor made. There was then considerable discussion about the best mode of treatment. Dr. Taylor can tell us how the argument ran in the tumor clinic.

DR. TAYLOR: The discussion revolved about whether we were ever going to cure Ewing's tumor of the long bones by any means, and there was a great deal of pessimism expressed. Dr. Simmons has records in the registry of bone sarcomas of some cures by means of radical surgery. The response of the immediate local process to x-ray therapy is very gratifying in controlling the local manifestations of the disease until the patient succumbs to the pulmonary metastases. Control of the local process is all that can be secured by radi-

cal amputation, and the only hope in surgery is that one may obtain complete early removal of the disease and get rid of it before the pulmonary metastases have been established. It is perhaps reasonable to hope that effective local radiation might bring about the same result, namely eradication of the local process before dissemination has taken place. Whatever method of treatment is followed, the results have been uniformly very poor. I think that generally the radiologists believed that they would like to try radiation therapy on this case, and the surgeons thought that they would like to carry out amputation. A very poor third method of treatment was brought up only to be condemned, and that was the question of whether a resection of the involved bone could be carried out. I believe that the patient was finally treated by radiation.

DR. MALLORY: She is undergoing x-ray treatment now.

DR. SIMMONS: In the registry there are records of some patients who lived without disease over five years. Two of these cases that I know of were controlled with radiation treatment. The others were treated by amputation. Unfortunately, statistics based on the cases reported to the registry are misleading, because surgeons are likelier to report favorable than unfavorable cases. I personally looked up 35 consecutive cases of Ewing's sarcoma treated by radiation or surgery—in all of which the patients are now dead.

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal

Established In 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of
THE MASSACHUSETTS MEDICAL SOCIETY
and
THE NEW HAMPSHIRE MEDICAL SOCIETY

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SUBSCRIPTION TERMS \$6.00 per year in advance, postage paid, for the United States; Canada, \$7.04 per year, Boston funds, \$8.52 per year for all foreign countries belonging to the Postal Union.

MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

PHYSICIAN VERSUS PHARMACIST

OUR esteemed, if relatively youthful, contemporary, the *Journal of the American Medical Association*, has taken a recent fling—and a deserved one, we believe—at our present most popular panaceas, the total vitamins.* The vitamins have had an interestingly prolonged build-up. Their existence was recognized, even if their nature was unknown, when Captain Cook first sailed the south Pacific and when the Dutch fishermen of the sixteenth century fed cod-liver oil to their babies to prevent that same rickets that Glisson so carefully described in 1650. It was not until 1911

that Funk first used the word, spelling it with a final "c," but these were not vitamins plus.

Cod-liver oil in those better days before horsepower replaced the horse cured only rickets; the juice of limes and other citrus fruits was used merely for its direct attack on scurvy; vitamin B, majestic, undivided and alone, made dietary war on the scourge of beriberi, until the alphabet gave substance to the conquest of pellagra by conferring a new letter on its conqueror.

The picture has been changing with increasing rapidity. Ultraviolet radiation has long since taken its stand as a practical counterpart of vitamin D; the vitamins no longer simply cure deficiency diseases but are essential contributors to positive health; vitamins E and K have been added to the list, and vitamin B has undergone lightning-like and repeated mitosis. The vitamin B complex, indeed, must now strut its part weighed in gammas, measured in international and Sherman-Bourquin units, and subdivided into numbered fractions—riboflavin and nicotinic acid, the filtrate factor, pantothenic acid, factor W, the factor of rat antidermatitis and the antigraying-hair factor.

A decade ago the vitamins constituted the coming therapeutic fact. Today, with a few endocrine hormones and the infant sulfa sisters sharing the stage, they are therapy itself.

The *Journal of the American Medical Association* tells us, in this same exposé of "vitamins plus," that more than two hundred vitamin products were pictured recently in an advertisement by a Chicago *department store*. No advertisement that we have yet seen informs us that all the necessary vitamins, in suitable quantities for those who are able to assimilate them, may be present in a well-balanced, properly prepared diet.

The vitamin preparations that can be sold over the counter and taken with presumable safety continue to capture the popular imagination, but it is also more than a half-truth that we who are medical practitioners have largely, and perhaps perforce, given over our therapy to the purveyors of proprietary preparations. Our investigative col-

*Editorial Nonplusing "vitamins plus" J. A. M. A. 115:1639, 1940

leagues, as we know, have been devising new methods in their laboratories and their clinics, but it is on the pharmaceutical houses and their detail men that we rely for the real ammunition of our practice, and to know where to buy and how to use the pills and potions, the panaceas and palliatives that scientific ingenuity and economic enterprise are supplying to us in such an endless stream.

We cannot master it all; we have little basis for selection; we know that it may take years to establish the real value of many of our vitamin preparations, our vaccines, our hormones and our drugs, and yet we cannot risk dropping out of the procession that so assuredly brands itself as medical progress.

Pharmacy is now far too complex for the corner pharmacist to supply the needs, much less the demands of the times, and the manufacturing pharmaceutical firm of good repute has become a very necessary adjunct to the effective service that we should all like to give. Is it, however, a part of this service that a single firm should list no fewer than twenty-four vitamin products running the gamut of the alphabet in various combinations from A to K, from alpha to omega and beyond?

POISON-IVY DERMATITIS

DERMATITIS from poison ivy—the shiny, three-leaved pest draped abundantly over New England scenery from spring to winter—is always with us. The vine was probably a hazard to the comfort of the Pilgrims and, like sunburn, hay fever and mosquito bites, flourishes as a disturber of the peace of both natives and summer visitors. The variations in the susceptibility of a person to the plant and the latent period between the exposure to its poison and the involvement of the skin are emphasized anew in this issue of the *Journal*.

The monograph, *Dermatitis Venenata*, published in 1887 by James Clarke White,¹ the first professor of dermatology at Harvard Medical School,—and in this country for that matter,—presented the results of keen observation, an ex-

cellent botanical knowledge and a wide clinical experience with the effects of this plant on the skin. McNair² developed much of importance regarding susceptibility to the plant and the resulting dermatitis. Therapeutic remedies have been legion, and many suggestions for prevention have been made. Some success in prevention has been reported following the oral administration of a diluted tincture of the plant, in accordance with the suggestion of Schamberg,³ and experiments are being made as to the efficacy of an extract⁴ for oral administration. In some persons, immunity has been produced by the injection of an extract of the plant each year before possible exposure.⁵

More recently, Schwartz, Warren and Goldman⁶ have recommended a preventive cream. Sodium perborate was added to a vanishing-cream base, and the mixture applied to the skin before exposure to the leaf. The volunteers on whom the fresh leaf was rubbed after the cream was applied did not develop any irritation. Only a few persons have thus far been tested, but the method deserves further trial by those who may be exposed to the plant. So far as is known, the effect of the paste on exposed persons has not been determined. This work resulted from an attempt to find a substance that would decompose or split up the complex chemical, urshiol, which is the active principal of the plant. Potassium permanganate will render the toxic agent inert, but discolors the skin; hence a search was made for a colorless preparation. This new method is relatively simple but must be used before every period of possible exposure. Although this is a handicap, any method that will prevent the dermatitis can well earn the praises of the many sufferers who are sensitive to this plant.

REFERENCES

1. White, J. C. *Dermatitis Venenata: An account of the action of external irritants upon the skin*. 216 pp. Boston: Cupples and Hurd, 1887.
2. McNair, J. B. Susceptibility to dermatitis from *Rhus diversiloba*. *Arch. Dermat. & Syph.* 3:625-633, 1921.
3. Schamberg, J. F. Desensitization of persons against ivy poison. *J. A. M. A.* 73:1213, 1919.
4. Shelmire, B. Nature of the excitant of poison ivy dermatitis. *Arch. Dermat. & Syph.* 42:405-409, 1940.
5. Strickler, A. The toxin treatment of dermatitis venenata. *J. A. M. A.* 77:910-913, 1921.
6. Schwartz, L. S., Warren, L. H. and Goldman, F. H. Protective ointment for the prevention of poison ivy dermatitis. *Pub. Health Rep.* 55:1327-1333, 1940.

MEDICAL EPONYM

GRUBER-WIDAL TEST

The Gruber-Widal test is based on the theoretical investigations of Max von Gruber (1853-1927) of the Department of Hygiene in the University of Munich, and their practical application by Fernand Vidal (1862-1929). Von Gruber, in an article entitled "Theorie der activen und passiven Immunität gegen Cholera, Typhus und verwandte Krankheitsprocesse [Theory of Active and Passive Immunity to Cholera, Typhoid Fever and Related Diseases]," which appeared in the *Munchener medizinische Wochenschrift* (43: 206, 1896), concludes:

By means of intraperitoneal inoculation with the killed culture of the vibrio of cholera, . . . the typhoid bacillus, and the colon bacillus, a high-grade and persistent immunity may be achieved in the guinea pig. . . . Antibodies are present in the blood and body fluids of the immunized animals. . . . The essential effect of the antibodies of the body fluids in these immunized animals consists in a destructive alteration of the enveloping structures of the bodies of the bacteria. This is shown by the fact that bacteria treated with these fluids become viscid, collect in large clumps and lose their individual motility.

Widal, in his article "Sero-diagnostic de la fièvre typhoïde [The Serum Diagnosis of Typhoid Fever]," which appeared in the *Bulletins et mémoires de la Société médicale des hôpitaux de Paris* (13: 561-566, 1896), after acknowledging his debt to Pfeiffer, Koll and von Gruber, says:

We present a new method, which makes possible the diagnosis of typhoid fever simply by observing the effect of the patient's serum on a bouillon culture of Eberth's bacillus. . . . A small amount of blood . . . is collected under aseptic precautions; . . . the serum is decanted, and several drops are added to a tube of broth in the proportion of one part of serum to ten or fifteen parts of bouillon. . . . After twenty-four hours, the bouillon is only faintly clouded; a few floccules have settled to the bottom, and a whitish, rather heavy suspension is visible throughout the length of the tube. . . . Inspection of the tube is not enough; microscopic examination is also necessary. . . . The bacilli, instead of wriggling all over the preparation . . . are seen to be grouped, agglutinated together. . . . The diagnosis may also be made more quickly. . . . It may be so apparent that six drops of serum mixed with 4 cc. of culture, after being kept at room temperature for two or three hours, will produce the characteristic clumping to the naked eye. . . . The diagnosis must never be made until after microscopic examination. . . . If one drop of serum is added to ten drops of a culture of Eberth's bacillus, one may almost immediately demonstrate the characteristic bacterial agglomeration under the microscope.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

SPECIAL MEETING OF THE COUNCIL

A special meeting of the Council of the Massachusetts Medical Society will be held in John Ware Hall, Boston Medical Library, 8 Fenway, Boston, on Wednesday, April 9, 1941, at 10:30 a. m., by vote of the Council on February 5, 1941, as provided in Chapter IV, Section 1, of the by-laws.

Business: To consider various changes in the by-laws recommended to the Council at its meeting on February 5, 1941 by the Committee on Medical Education and Medical Diplomas and by the Committee to consider new officers and by-laws.

Incidental business.

ROBERT N. NYE, *Secretary pro tempore*.

Councilors are asked to sign one of the two attendance books before the meeting. The Cotting luncheon will be served immediately after the meeting.

SECTION OF OBSTETRICS
AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

HEART DISEASE IN PREGNANCY

Between 1 and 2 per cent of pregnant women in this country have organic heart disease. Many of these have minor valvular lesions of little consequence, and others have such severe cardiac damage as to involve considerable risk to the life of the mother and even more to the fetus. In addition to the relatively small group with clear-cut organic disease of the heart, there is a much larger group in whom the appearance of disease is simulated by functional systolic murmurs that may be quite loud and by symptoms such as dyspnea, palpitation and ankle edema that are not uncommon in normal pregnant women. It is the first task of the attending physician to determine, if possible, whether or not organic heart disease is present. A convenient rule of thumb is that organic heart disease exists if any of the following features are present: a diastolic murmur, definite cardiac enlargement, or auricular fibrillation. If these features are absent, the heart may be regarded as practically normal. There are exceptions to this rule, but they are rare.

Having satisfied himself that organic heart disease is present, the physician attempts to evaluate the degree of cardiac disability. The question

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

whether a given cardiac patient will be able to go through to term successfully can usually be answered better by the patient herself than by the intensity of the murmurs or other physical findings. If she gives a history of previous heart failure, she is likely to go into failure again before she reaches term. The older patients are, in general, poorer risks than the younger. Dr. Burton Hamilton has pointed out that heart failure occurs twice as often in women over thirty-five as in women under thirty-five years of age. Complications such as hypertension or pulmonary infection also add to the gravity of the prognosis. If the patient is young and her heart has never failed and there are no complications, the chances are good that she will carry her pregnancy through to a successful termination, regardless of the valvular lesion.

In considering the problem of the management of the heart patient in pregnancy, due weight should be given to recent work regarding the extent to which the gravid uterus burdens the circulation. Clinical and physiologic studies at the Boston Lying-in Hospital and elsewhere indicate that the work of the heart is increased about 40 to 50 per cent during pregnancy. Of great practical significance is the accumulated evidence that the peak of increased cardiac work is reached not at term but about one month before term. The subjective "lightening" observed by so many patients at this time appears to be associated with objective evidence of an easing of the load on the circulation, the cardiac output actually approaching normal before delivery.

In the light of this evidence, the practice in some clinics has changed from emptying the uterus as soon as a viable baby could be obtained to allowing the cardiac patient to go to term if possible. This policy has resulted in a decline in both maternal and fetal mortality.

The physical activity of all patients with organic heart disease should be rigidly restricted throughout pregnancy. They should have assistance in their household duties, and they should be instructed to go to bed at the first sign of a respiratory infection. They should be carefully examined for early signs of heart failure at least every two weeks during the first half of pregnancy, and once a week thereafter. The earliest sign of failure is usually *persistent* rales at the lung bases, which may appear before the patient herself is aware that anything has gone wrong. Once failure has set in, the patient should be put to bed and kept there under hospital conditions of absolute rest until she is delivered. If failure comes

on during the first four months, it is extremely unlikely that the patient can be brought to term with a living baby, and it is well to advise interruption at this time. If failure does not occur until the sixth month or later, every effort should be made to tide the patient over with digitalization and absolute rest until she goes into labor, and then to let her deliver spontaneously from below. It is not advisable to give digitalis unless failure is present or appears to be impending. Surgical interference should never be attempted while the patient is in failure. The maternal mortality under such conditions is 50 per cent. If the uterus is not interfered with and severe congestive failure persists, the patient is apt to go into labor spontaneously, and it is the lesser risk to allow her to do so with the operator standing by to make the second stage as brief as possible as soon as the cervix is fully dilated.

So far as anesthesia is concerned, particular care should be taken to avoid anoxia and excitement. Ether and oxygen anesthesia in skilled hands is very satisfactory.

Under careful supervision the maternal mortality in heart disease can be reduced to nearly 2 per cent.

COMMITTEE ON STATE AND NATIONAL LEGISLATION

House Bill 1222, a bill proposing a separate board of registration for chiropractors will soon be brought before the House of Representatives.

This type of bill always has a good deal of active support, and your Committee on State and National Legislation strongly urges all fellows to write to their representatives and senators, asking them to work and vote against the bill.

The following bill is scheduled for hearing at the State House during the week of March 17:

March 18

H. 1618 (Public Health). Petition of D. N. Potter and others that certificates of vaccination or nonvaccination shall no longer be required as a prerequisite to attendance in the public schools or other institutions of the Commonwealth. The perennial antivaccination bill. *Opposed.*

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning March 16:

BERKSHIRE

Thursday, March 20, at 4:30 p.m., in the Bishop Memorial Building, Pittsfield. Dermatitis and Ec-

zema Instructor Maurice M Tolman Harry
G Mellen, *Chairman*

BRISTOL SOUTH (Fall River Section)

Tuesday, March 18, at 4 30 p.m., at the Union Hospital, Fall River Recent Advances in Medical Therapeutics Instructor Clifford L Derick
Howard P Sawyer, *Chairman*

FRANKLIN

Thursday, March 20, at 8 00 p.m., in the Library of the Franklin County Public Hospital, Greenfield Nutritional Deficiencies and the Uses of Preparations of Vitamins Instructor Harold J Jeghers
Halbert G Stetson, *Chairman*

HAMPDEN

Wednesday, March 19, at 4 00 p.m., at the Academy of Medicine, Professional Building, 20 Maple Street, Springfield, and at 8 00 p.m., in the Outpatient Department of the Skinner Clinic, Holyoke Hospital, Holyoke. Chemotherapy in the Treatment of Gonococcal Infection Instructor Sylvester B Kelley Alfonso A Palermo,
Chairman

HAMPSHIRE

Thursday, March 20, at 4 15 p.m., in the Nurses' Home of the Cooley Dickinson Hospital, Northampton Technique and Treatment of Primary, Secondary and Tertiary Syphilis Instructor William P Boardman Robert C Byrne,
Chairman

WORCESTER

Tuesday, March 18, at 8 30 p.m., in the Nurses' Home of the Milford Hospital, Milford Technique and Treatment of Primary, Secondary and Tertiary Syphilis Instructor C Guy Lane Joseph Ashkins, *Chairman*

WORCESTER NORTH

Friday, March 21, at 4 30 p.m., in the Nurses' Home of the Burbank Hospital, Fitchburg Obstetric Infections Diagnosis and Treatment Instructor Judson A Smith George P Keaveny, *Chairman*

DEATHS

FRANCIS—CARLETON S FRANCIS, M.D., of Brookline, died March 8 at Kerrville, Texas. He was in his seventy sixth year.

Born in Brookline, he attended Harvard University and received his degree from the Harvard Medical School in 1897. He studied abroad for a year and then opened an office in Brookline.

He was a member of the Massachusetts Medical Society and the American Medical Association.

His widow and two sons survive him.

WETHERELL—BRYANT D WETHERELL, M.D., of Boston, died March 5. He was in his fifty third year.

Dr Wetherell attended Williams College and received his degree from Harvard Medical School in 1918. He was a fellow of the Massachusetts Medical Society and the American Medical Association, and was on the staff of the Massachusetts General Hospital.

His widow survives him.

MISCELLANY

THE MEDICAL LIBRARY ASSOCIATION

Every physician who recognizes the important place that medical literature has in the rapid march of scientific progress will look with approval and gratification upon the splendid work of the Medical Library Association. Composed of all medical libraries of any consequence in the United States, and many in Canada and abroad, this group has long been committed to the development of medical libraries and to the better organization of library resources so that they may be of the greatest possible help in the furtherance of medical research and achievement. It goes without saying that the individual libraries and librarians that constitute the larger part of the membership have been of tremendous assistance to physicians and others in their daily investigations and experiments, hence, the association merits the support of physicians.

Organized some forty three years ago, the Medical Library Association has become preeminent in its field and enjoys a well earned international reputation. Dr G M Gould, who was its founder, was also its first president. Succeeding him in this office were such illustrious men and women as Osler, Chadwick, Jacob, Dock, Musser, C Perry Fisher, J C Wilson, F R Packard, Lt Col C C McCulloch, H L Taylor, Brown, Ing, Garrison, Farlow, Barker, Wyde, Tice, Ruhrah, Malloch, Steiner, Miss M C Noyes, C Frankenger, W W Francis and J F Ballard. Colonel Harold W. Jones, of the Army Medical Library, is now president.

Perhaps the most outstanding activity of the association is its maintenance of an exchange—a clearing house through which members may exchange their duplicate books and journals with other libraries, so that they may find a place where they are needed. Every member library has profited by this mutually helpful arrangement, and frequently member institutions are able to complete series of great value.

Libraries having at least 1000 volumes of medical interest and open for regular use with a full time librarian on duty are eligible for membership.

Officers and members of the association have worked untiringly toward the achievement of its numerous objectives, but it is admitted that support from dues alone is insufficient, owing to the limited number of medical libraries that are eligible for membership. As a consequence, the membership committee of the association is endeavoring to attract a larger number of supporting members from among its physician friends and others. A supporting member may be any person interested in medical libraries and medical literature. The dues are \$5.00 annually, this includes the interesting quarterly *Bulletin of the Medical Library Association*. A supporting member has the privilege of attending the annual meetings and of making suggestions for the association's program. Dr A H Sanford, of the Mayo Clinic, recently has contributed an article (The supporting member *Bull M L A* 28 100-104, 1939), which points out some of the advantages accruing to the physician who participates in the work of the association through this type of membership.

The Medical Library Association is striving to create a stronger bond with the medical profession and to derive mutual benefit from a better understanding of its manifold problems. Further information and application blanks may be had from Miss Louise Williams, Chairman, Membership Committee, Old Capitol Jackson Mississippi.

REPORT OF MEETING

BOSTON ORTHOPEDIC CLUB

A regular meeting of the Boston Orthopedic Club was held at the Boston Medical Library on December 18, 1940. Dr. Fritz Teal, of Lincoln, Nebraska, spoke on the Orr method of treating compound fractures. The speaker recounted how Dr. Orr decided on his procedure. In studying war wounds in World War I, he concluded that immobilization of a fractured limb was best carried out by plaster of Paris and that the true goal of asepsis is the exclusion of infection rather than the discovery of effective bactericides. This original principle of Lister has often been lost sight of in many methods of caring for infection, such as the Carrel-Dakin treatment.

The Orr method consists in following the first fracture principles of good apposition and adequate immobilization. The fundamental aseptic principle of excluding further infection is carried out. And finally the technic of Paré—whereby the natural reparative properties of the body are allowed to carry out their work—is adopted. It is a simple, effective, timesaving method that may be employed in already infected as well as new cases. Dr. Teal stated that there is a decrease in the time of healing, better apposition, lack of introduction of bacteria by irrigation, failure of proteolysis and absence of evaporation and dehydration. It is not applicable to all cases, a noteworthy exception being those in which there is extensive soft-tissue damage.

In reviewing statistics of World War I, Dr. Teal remarked that 50 per cent of all fractures of the femur, tibia and humerus resulted in disability eight years later. He stated that although the use of Thomas splints and Dakin irrigations resulted in some improvement, the results still fell short of the optimum.

In contrast were cited the results in the recent Spanish War, where two different reports indicated a mortality of only about 3 to 5 per cent in cases of compound fracture. Furthermore, the number of amputations necessary was only 4 out of 1100 in one report and none in 5000 in the other. That gas gangrene is definitely decreased in the Orr treatment, even when bacteria may be demonstrated, was substantiated by the finding of this complication in only 1 of the 5000 cases thus treated.

Dr. Teal reviewed briefly the technic of the Orr treatment. The injured extremity is thoroughly cleaned with soap and water and then prepared with iodine around the lacerated area only. The patient is placed on a fracture table, although this is not necessary, and proper alignment is obtained by traction and assured by fluoroscopic examination. The field is then draped and widely débrided. Irrigation was found necessary only rarely. The opening is enlarged as necessary. Fixation pins are placed as soon as cleansing and débriding are complete. No sutures are employed. Vaseline gauze is then placed in the wound, although any similar type of dressing may be used. A sterile dressing, sheet wadding and plaster of Paris are then applied, and there is rarely any reason to remove these for inspection, for the clinical chart will furnish the necessary clues to infection. After four to six weeks a window is made in the cast under aseptic precautions. The cast may be changed if secondary infection is present. It has been found that the wound is usually healed by the time of fracture healing.

At the Orr clinic, good results are obtained in 84 per cent of cases, despite the fact that almost half the patients are referred to the clinic after previous treatment. In 6

cases, amputation, although advised elsewhere, was not performed, and 5 of these patients made a satisfactory recovery.

The discussion was opened by Dr. Henry Marble, of the Massachusetts General Hospital, who defended the use of the Thomas splint and the Carrel-Dakin treatment as carried out during World War I. The patients always arrived at the base hospitals in good condition, the wounds were secondarily sutured, and the dressings were neither painful nor time consuming. One objection to the Orr method was that plaster does not hold the fracture well, especially when it involves the tibia and femur, with the result that traction must often be resorted to. The incorporation of pins has corrected this, it was admitted. Other points not considered in the Orr treatment are the function of neighboring joints and the atrophy of muscle.

Dr. Otto Hermann, of the Boston City Hospital, emphasized that any method properly carried out usually gives good results. Sherman, of Pittsburgh, over a period of twenty-three years treated over 11,000 cases by débriding, irrigating with Carrel-Dakin solution and fixing by external or internal methods, as indicated. Of 630 fractures of long bones there were 23 amputations, no cases of sepsis and 2 deaths—from embolus and shock. Dr. Hermann concluded that the Orr method may prove efficacious in wartime, but that Sherman's methods seem better when time and space are available. At the Boston City Hospital, primary suture is carried out if the wound is less than eight hours old, and if a careful history shows that the place and manner of injury are not contraindications to such a procedure. A soap-and-water scrub is carried out for fifteen to twenty minutes. Irrigation is used only after the wound edge has been débrided. The type of fixation depends on the demands of the individual patient.

Dr. William Rogers, of the Massachusetts General Hospital, reiterated the importance of immobilization and surgical nonintervention. He believes, however, that vitalium plates, especially when combined with traction, afford better immobilization than plaster, even when pins are incorporated; this also allows uninterrupted observation. The wound is left alone until walled off by granulation tissue, whether promoted by vaseline gauze or some other means. Bone chips should be left in place. Chemotherapy is employed whenever indicated.

Dr. Carl Walter, of the Peter Bent Brigham Hospital, stated that no one routine was carried out at that institution, the usual method being to cleanse thoroughly, carry out primary suture when possible and treat the wound as an ordinary fracture. The few deaths were from indirect causes, and amputations only for gas gangrene. Dr. Walter emphasized that Lister was primarily interested in asepsis as opposed to antisepsis, one of his first reported cases being a compound fracture that received treatment essentially similar to the Orr method. Lister stressed the importance of nonintervention and the wide spacing of any dressings, and then the changing of only the exterior ones until healing has taken place.

The discussion was continued by Dr. Champ Lyons, of the Massachusetts General Hospital, who presented his views on chemotherapy, especially as related to anaerobic infection. Anaerobic bacteria are relatively frequent contaminants, and the duration or mode of accident does not ensure against their presence. Statistics are as yet inconclusive as to the effect of the newer chemicals on the gas-forming organisms or their relative therapeutic effects. Sulfathiazole, it has been demonstrated at Johns

Hookins Hospital, delays sound wound healing, and inhibits the growth of epithelium and fibroblasts in a concentration of 20 mg per 100 cc. Sulfanilamide, on the other hand, has occasioned no trouble with healing in concentrations as high as 200-400 mg per 100 cc. Key has used sulfanilamide powder in wounds covered only by skin. Eight grams will result in a blood stream level of 12 to 14 mg, which rapidly declines unless auxiliary oral therapy is started in twelve hours. Sulfapyridine experimentally is more effective against established gas-bacillus infection than sulfanilamide, especially when serum is being used. Since it requires too long to determine which bacterium is at fault, the use of trivalent antiserum was advised. The initial therapeutic dose should be 120,000 units of *Clostridium welchii* and *C. oedematis* maligni antitoxins and 30,000 units of that for the other gas-forming bacilli. This is the amount contained in four therapeutic vials, and should be followed by two vials every eight hours until improvement occurs. A sulfapyridine level of 8 mg per 100 cc. should be maintained.

In closing the discussion, Dr Tenl explained that Dr Orr had been using pins for fifteen years, and that this was considered simpler than, and as effective as, plating. The latter was conceded to be satisfactory if left open. Primary suturing was found to invite too much trouble, especially since the wounds heal as soon as the fracture and can be improved by secondary plastic operations, if necessary.

NOTICES

MEDICAL AND SURGICAL SUPPLY COMMITTEE

It will help England greatly in the care of victims of bombing raids and help England prepare for the coming invasion, if physicians in this country will give discarded or superfluous surgical instruments or surgical dressings.

Any such material should be sent to the Medical and Surgical Supply Committee, 420 Lexington Avenue, New York City.

COMMUNITY NURSING COUNCIL OF BOSTON

The third annual meeting and luncheon of the Community Nursing Council of Boston will be held at Perkins Hall, Women's Educational and Industrial Union, 264 Boylston Street, Boston, on Thursday, March 27, at 12:30 p.m.

PROGRAM

Business meeting
Nursing in National Defense. Miss Stella Goostray, R.N.
The Federal Census of Registered Nurses. Miss Helene G. Lee, R.N.
Progress of Legislation. Miss Margaret Dieter, R.N.
The charge for luncheon will be 75 cents. Reservations sent to the Community Nursing Council of Boston, 80 Federal Street, Boston, should be made by Monday, March 24.

CARNEY HOSPITAL

The monthly clinical meeting and luncheon of the Carney Hospital will be held in the auditorium of the Carney Hospital on Monday, March 24 at 11:30 a.m.

PROGRAM

Nasal Allergy. Dr. William T. Holey
Review of Cases Requiring Hysterectomy at Term. Dr. William J. McDonald.
Acute Cor Pulmonale. Dr. Sylvester McGinn.
Surgical Diseases of the Breast. Dr. John W. Spellman.
Physicians and medical students are invited to attend.

BOSTON LYING IN HOSPITAL

There will be a meeting of the Journal Club of the Boston Lying in Hospital on Wednesday, March 19, at 8:15 p.m. Dr. Edward G. Waters, assistant clinical professor of obstetrics and gynecology, Columbia University College of Physicians and Surgeons, will speak on Local and Spinal Anesthesia in Obstetrics.

Physicians and medical students are cordially invited to attend.

NEW ENGLAND SOCIETY OF PHYSICAL MEDICINE

There will be a meeting of the New England Society of Physical Medicine at the Hotel Kenmore, Boston, on Wednesday, March 19, at 8:00 p.m. A council meeting at 6:00 p.m. will be followed by an informal dinner in the Empire Room at 6:30 p.m.

PROGRAM

Symposium on the Treatment of Arthritis
The Parenteral Use of Amodoxyl Benzoate. Dr. Albert G. Young.
Methylol Iontophoresis. Dr. Wilmot L. Marden.
Diathermy. Dr. William D. McFee.
X-ray. Dr. Herman A. Osgood.
Discussion by Dr. A. Carleton Potter.

All members of the medical profession are cordially invited to attend.

NEW ENGLAND HEART ASSOCIATION

There will be a meeting of the New England Heart Association on Monday, March 24, in the pathological amphitheater of the Boston City Hospital at 8:15 p.m.

PROGRAM

Familial Occurrence of Congenital Cardiac Anomalies. Drs. Gerald C. Walker and Laurence B. Ellis.
The Influence of the Climacteric on the Course of Organic Heart Disease. Drs. Burton E. Hamilton and Paul Kunkel.
Paroxysmal Ventricular Tachycardia. A study of 33 cases. Dr. Conger Williams.
The Significance of the Wandering Auricular Pace-maker. Dr. Andrew M. Burgess, Jr.
The Occurrence of Sinus Arrhythmia in Association with Acute Myocardial Infarction. Dr. Carey M. Peters.
Nonarterial Disorders Simulating Diseases of the Peripheral Arteries. Dr. Edward A. Edwards.
Interested physicians and medical students are cordially invited to attend.

NEW ENGLAND PATHOLOGICAL SOCIETY

The next meeting of the New England Pathological Society will be held at the Children's Hospital on Thursday, March 20, at 8 p.m.

PROGRAM

Survey of the Bacteriological Laboratories in Massachusetts. Dr. Leo Ranc.

Co-operation between the Pathologist and the Embalmer. Mr. Austin W. Martin.

What Deaths Are Medico-Legal? Dr. William J. Brickley.

Business meeting.

NEW ENGLAND OTO-LARYNGOLOGICAL SOCIETY

The regular spring meeting of the New England Oto-Laryngological Society will be held on Wednesday, March 19, at the Massachusetts Eye and Ear Infirmary, 243 Charles Street, Boston, at 4 p.m. The evening program will be devoted to a symposium on "The Management of Some of the Complications Arising from Acute and Chronic Otitis Media." Discussion will follow by Drs. Harold Tobey, Charles T. Porter, Maxwell Finland, Champ Lyons, W. Jason Mixter and Charles S. Kubik.

NORFOLK DISTRICT MEDICAL SOCIETY

A regular meeting of the Norfolk District Medical Society will be held at the Hotel Puritan, Boston, on Tuesday, March 25, at 8 p. m.

PROGRAM

Business.

Nutritional Deficiencies and the Uses of Preparations of Vitamins. Dr. Harold J. Jeghers.

Discussion.

Collation.

26TH DIVISION MEDICAL SERVICE

The 26th Division (Massachusetts) is rapidly filling to war strength with men from almost every walk of life. One outstanding numerical exception has been the representation of the Massachusetts Medical Society.

More qualified physicians are required to fill vacancies in the Division Medical Service. The requirements are: a medical diploma from a Class-A School, a minimum of one year's internship and a sound physique. The candidate must also be no more than thirty-five years of age. Previous military training is desirable but not essential.

AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS AND AMERICAN INDUSTRIAL HYGIENE ASSOCIATION

The annual meeting of the American Association of Industrial Physicians and Surgeons and the American Industrial Hygiene Association will take place from May 5 to 9 at the Hotel William Penn, Pittsburgh, Pennsylvania. Industrial health specialists from all parts of North and South America will attend. An intensive graduate course in present-day industrial health problems will be presented. May 5 will be devoted to a series of dry clinics in industrial medicine and surgery at the Mercy Hospital. For detailed information write to Mr. A. G. Park, executive secretary, 540 North Michigan Avenue, Chicago, Illinois.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, MARCH 16

MONDAY, MARCH 17

12:15-1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.

TUESDAY, MARCH 18

*9-10 a.m. Syphilis and the Spinal Fluid. Dr. W. A. Hinton. Joseph H. Pratt Diagnostic Hospital.

*12 m. Asthma: Its treatment. Dr. Francis M. Rackemann. South End Medical Club. Headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston.

12:15-1:15 p.m. Clinicoroentgenologic conference. Peter Bent Brigham Hospital amphitheater.

WEDNESDAY, MARCH 19

*9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

*12 m. Clinicopathological conference. Children's Hospital.

4 p.m. New England Oto-Laryngological Society. Massachusetts Eye and Ear Infirmary, 243 Charles Street, Boston.

*8 p.m. New England Society of Physical Medicine. Hotel Kenmore, Boston.

*8:15 p.m. Boston Lying-in Hospital. Journal Club meeting.

THURSDAY, MARCH 20

*8:30 a.m. Combined clinic of the medical, surgical, orthopedic and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital, at the Children's Hospital.

*9-10 a.m. Tobacco and Peripheral Vascular Disease. Dr. J. S. Sprague. Joseph H. Pratt Diagnostic Hospital.

11 a.m.-3:30 p.m. Massachusetts Tuberculosis League. University Club, Trinity Place and Stuart Street, Boston.

8 p.m. New England Pathological Society. Children's Hospital, Boston.

FRIDAY, MARCH 21

*9-10 a.m. Arthritis clinic. Dr. W. Bauer. Joseph H. Pratt Diagnostic Hospital.

SATURDAY, MARCH 22

*9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

*Open to the medical profession.

MARCH 21-22 — New York University College of Medicine, Alumni Day. Page 135, issue of January 16.

MARCH 23 — Free public lecture, Quincy City Hospital. Page 436, issue of March 6.

MARCH 24 — New England Heart Association. Page 483.

MARCH 24 — Corney Hospital. Page 483.

MARCH 26 — Tufts College Medical School Alumni Association. Page 343, issue of February 20.

MARCH 27 — Community Nursing Council of Boston. Page 483.

MARCH 31-APRIL 4 — Sixth Annual Postgraduate Institute of the Philadelphia County Medical Society. Page 349, issue of February 20.

APRIL 2-4 — New England Health Institute. Page 398, issue of February 27.

APRIL 10 — Pentucket Association of Physicians. Page 263, issue of August 15.

APRIL 21-25 — American College of Physicians. Page 1065, issue of June 20.

APRIL 28-30 — American Academy of Physical Medicine. Scientific session. Hotel Pennsylvania, New York City.

MAY 5-9 — American Association of Industrial Physicians and Surgeons and American Industrial Hygiene Association. Notice above.

MAY 21, 22 — Massachusetts Medical Society, Boston.

MAY 28-JUNE 2 — American Board of Obstetrics and Gynecology. Page 262, issue of February 6.

JUNE 2-6 — American Medical Association. Cleveland, Ohio.

OCTOBER 14-17 — American Public Health Association. Page 135, issue of January 16.

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

APRIL 2 — Pediatric Problems in General Practice. Dr. Joseph Garfield. Addison Gilbert Hospital, Gloucester.

MAY 14 — Relation of the Doctor to the Law. Mr. Leland Powers. New Ocean House, Swampscott.

FRANKLIN

MAY 13 — This meeting will be held at 11 a.m. at the Franklin County Hospital, Greenfield.

NORFOLK

March 25—Page 484

Mix 8—Censors meeting Hotel Puritan

SUFFOLK

Apr 1 30—Page 604 issue of October 10

May 1—Censors meeting Page 261 issue of February 6

WORCESTER

April 9—Hahnemann Hospital Worcester

Supper at 6 30 p.m. followed by a business meeting and scientific program

BOOK REVIEWS

Rose and Carless Manual of Surgery. Sixteenth American edition. Edited by William T. Coughlin, MD. From the sixteenth English edition by Cecil P. G. Wakeley, DSc., FRCS, FRSF, FRSA, FRACS, and John B. Hunter, MC, MChir (Cantab.), FRCS 8°, cloth 1656 pp., with 1034 illustrations and 30 colored plates. Baltimore: Williams and Wilkins Company, 1940 \$9.00

According to the author's preface, this ponderous text—it weighs 6½ pounds—has been thoroughly revised and the first eight chapters have been entirely rewritten. These chapters discuss general and specific infections, inflammation and repair, ulceration, gangrene, wounds, tumors, hemorrhage and shock. It seems reasonable to examine them to determine how much new material has found its way into the book.

Seven pages are devoted to the subject of shock, and the following statements appear in the text. All observers are agreed that the constant feature [of shock] is the depression of the blood pressure from the normal systolic pressure of 110 to 120 mm of hemoglobin to 50 or below.

An estimation of the color index of the blood may help [in diagnosis], since it is normal in pure shock, but is lowered following hemorrhage. The only reference to transfusion in the treatment of shock is as follows: "The actual transfusion of blood is often useful, but may be disappointing in its effect. It is most valuable in cases of shock associated with severe hemorrhage where the patient's condition is aggravated by anoxemia from the lowered hemoglobin. In pure shock the loss of blood volume is a loss of the fluid portion of the blood and transfusion in these cases is of less value than the use of intravenous saline. The hemoglobin content of the blood may be taken as a guide, in shock a fall of hemoglobin below 70 per cent would form an indication for a blood transfusion."

In regard to the treatment of wounds, it is stated, "Tincture of iodine, either full strength or diluted half with 95 per cent alcohol, is in very general use for the first antiseptic treatment of wounds. The excess is removed from the wound by pouring in alcohol."

In the care of septic joints, following drainage, "the essential element is to urge, or if need be coerce, the patient into moving the joint actively, however painful it may be."

The progressive undermining ulcers due to microaerophilic streptococcal infections are described as gangrene of the skin following operation, but there is no recognition of the extensive contributions that have been made in recent years to the etiology or therapy of these conditions. Although innumerable pharmaceutical preparations are recommended in treating various conditions, zinc peroxide finds no place in the index, and is referred to only once in the text in connection with the treatment of actinomycosis. Sulfanilamide is given nine references in the index, six of them to page numbers not present in the book. The remaining three briefly dis-

cuss the use of the drug in streptococcal and gonococcal infections, with a footnote reference to articles by the staff of the Wellcome Research Laboratories in the *Lancet* in 1936 and 1937.

Postoperative proptitis today is very rare, since oral sepsis is always treated before any abdominal operation is contemplated. Treatment should be prompt, incision and drainage being required.

These quotations have been selected deliberately to emphasize the wide divergence that apparently exists between American and English teaching in surgery, and to point out how difficult it is to find a text that can be carried through numerous editions and still be up to date, with elimination of antiquated teachings and inclusion of new material. Similar quotations and omissions could be culled from most of the other chapters. Differences in terminology further complicate the picture and confuse the student. Thus, for example, benign giant cell tumor of bone is described as myeloma or osteoclastoma. In the treatment of osteogenic sarcoma, the authors state that x-ray treatment alone often causes a disappearance of the tumor, but recurrence is the rule.

Nearly 400 pages are devoted to orthopedic problems and diseases of bones, joints, and tendons. Superficial inspection of this section reveals an illustration of Colles fracture in a cast in the cock-up position, and a bone plate applied in reduction of a fractured femur, held in place with screws which extend only to the medullary cavity. The use of a pylon following amputation is condemned, there is apparently no appreciation of the mechanism of Volkmann's contracture, and passive movements of joints are strongly recommended in the restoration of function following injuries.

It is perhaps unnecessary to bring up more examples of omissions, inaccuracies and errors in the book. Some of the sections are sound. There are numerous illustrations and for the most part they are helpful in illuminating the text. In summary, however, it is the reviewer's opinion that a student would be ill advised to acquire or to depend on this text.

Juvenile Delinquents Grown Up. By Sheldon and Eleanor Glueck. 8°, cloth, 330 pp., with appendixes A, B and C and 85 tables. New York: The Commonwealth Fund, 1940 \$2.50.

This is unquestionably one of the most important objective and scientific discussions of juvenile delinquency to appear in recent years and gives the Gluecks first rank among the criminologists of the world. The reader may recall that in 1934 they published *One Thousand Juvenile Delinquents* a follow up study to determine the effectiveness of treatment.

In this book the authors make a painstaking and searching study of the same delinquents for the second and third five-year periods, directing their attention to such questions as, What has happened since? Have the delinquents gone from bad to worse, or has the picture brightened? How can one account for the changes in behavior? How far can delinquency be predicted? The thoroughness and ingenuity employed in ferreting out many of these elusive characters make interesting reading and document one angle of the Gluecks' scientific thoroughness.

The book consists of twenty-two chapters, it discusses the characteristics of delinquents follows them through the three periods and compares reformed and unreformed the young and the old and the serious and the minor offenders. The book makes a strong case for the possibility

of scientific prediction if judges, parole officers and boards would only begin the experimental use of the tables furnished.

With the passage of years there has been a steady diminution in the number of youths who continue to be offenders. By the age of twenty-nine almost 40 per cent have ceased to be criminals. Even among those who continued their criminal careers, significant improvement was noted. However, the chief cause of the improvement was not the penologic treatment but a natural process of maturation. For, regardless of the age of the offenders at the time delinquency began, it ran a fairly steady and predictable course. There is a marked resemblance in delinquent or criminal behavior at a point equidistant from the onset of misconduct, regardless of the age of the persons concerned.

Comparison of delinquents who reformed within fifteen years with those who had not reformed showed that the former had better heredity and more wholesome environment than the men who continued criminal careers. Those who reformed before twenty-one possessed both better innate equipment and environmental advantages. The more serious offenders had a worse congenital equipment and were reared in even less favorable circumstances than those responsible for minor offenses.

Four conduct types are distinguished, and prediction tables are offered that should make sentencing more intelligent if judges would experimentally sentence every other offender on the basis of it and study the results.

The authors conclude, "It is not so much arrival at any particular age-span . . . as the achievement of a degree of maturity, that makes for social adaptation on the part of former delinquents." Delinquents are primarily infantile; they mature much more slowly. Too often they reform by wearing out. As they get older they resort to minor crimes. They lose courage and do not have the physical equipment for more daring escapades.

This book will repay study by physicians, psychiatrists, sociologists and counselors of youth. It should be "must" reading for criminologists, judges and members of parole boards.

The Treatment of Diabetes Mellitus. By Elliott P. Joslin, M.D., Sc.D.; Howard F. Root, M.D.; Priscilla White, M.D.; and Alexander Marble, M.D. Seventh edition, thoroughly revised. 8°, cloth, 783 pp., with 117 tables. Philadelphia: Lea and Febiger, 1940. \$7.50.

This familiar and valuable treatise now appears in its seventh edition under the coauthorship of Drs. Joslin, Root, White and Marble. The revision of this study of 18,000 of their own cases, as well as bringing the ever-enlarging literature in this field up to date, is a task of no mean proportions, but it has been done thoroughly and effectively since the appearance of the sixth edition in 1937.

The increased frequency of allergic phenomena since the introduction of protamine insulin has led to a new chapter on allergy in diabetes by McDaniel, and the increased interest in hyperinsulinism has led to a chapter on this subject by Marble. A most valuable chapter is that on the physiology of diabetes, revised by Marble, which includes references to all the newer developments in this field, including the important work of Houssay, Young, Himsworth and many others.

There has been almost no important change in the treatment of diabetes in the last three years, but the study of the cases that have been treated with protamine insulin

for three years has led to a more standardized use of this important therapeutic agent. A diagrammatic outline of standard treatment such as appears on page 288 is the result of the observation of many thousand cases. Little has been changed in diet therapy, but the newer knowledge of vitamins has not been neglected and, in fact, appears in this volume in a summarized form that is most convenient, entirely apart from its value in treating diabetic patients.

Coma is still considered to be present whenever the carbon dioxide content is below 20 vol. per cent, whether or not the patient shows any disturbance of consciousness, although this method of classification has been the object of criticism from several sources. Whatever criteria are used, however, the mortality rate for acidosis cases treated by these authors remains a challenge for others to equal.

Dr. White's work with pregnant diabetic patients, particularly the prolan studies and estrin and progestin therapy carried on in conjunction with Smith and Smith, is most interesting, and the results of this treatment are most encouraging. Whether these results have been confirmed in other clinics is not stated.

The volume remains the standard work on diabetes mellitus.

Rheumatic Fever: Studies of the epidemiology, manifestations, diagnosis and treatment of the disease during the first three decades. By May G. Wilson, M.D. 4°, cloth, 595 pp., with 47 illustrations, 76 figures, 81 tables and 31 charts. New York: The Commonwealth Fund, 1940. \$4.50.

Of the economic importance of rheumatic fever in this part of the world there is no question whatsoever. An increasing amount of study has lately been devoted to it—Dr. Wilson herself has been interested in the subject for more than two decades. Although a great deal has been learned, there still remains more that has not. The most elaborate treatise of today, therefore, can represent only a sort of stocktaking of knowledge. Such stocktaking, however, is extremely valuable.

The work begins with a brief historical summary; then follow chapters on epidemiology, including familial epidemiology, on etiologic hypotheses and on bacteriologic studies. Part II embraces general signs and symptoms, heart involvement and involvement of other organs and tissues, and bacterial endocarditis. Part III covers the age and type of manifestation at onset, prognosis and life expectancy. Part IV discusses the criteria of diagnosis and differential diagnosis, including the regression of physical signs, radioscopic examination of the heart, and the value of exercise tests, of the measurement of vital capacity and of electrocardiography. Part V is devoted to the care, management and therapy of the rheumatic child. The discussions throughout are not merely general; they are illuminated and reinforced by appropriate case histories and are illustrated with charts, plates and tables based on actual experience. Moreover there are extensive bibliographies.

It is not necessary that every doctor should own this book, not even every pediatrician or cardiologist. But it should be in every medical library, and in the libraries of all hospitals where research is undertaken. For such a book of reference often saves repetitious work, or better still, may serve as the steppingstone to new and even more definitive studies.

The New England Journal of Medicine

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VOLUME 224

MARCH 20, 1941

NUMBER 12

FOLK MEDICINE IN NEW HAMPSHIRE*

HAROLD D. LEVINE, M.D.

BRISTOL, NEW HAMPSHIRE

IN the small towns and villages and in the countryside of New Hampshire there still exists a vast heritage of medical folklore, most of which stems from the practices of the original English settlers and their Indian neighbors. Even in the minds of the "old folks" this storehouse of "simples, bitters and specifics," of medical superstition and voodoo, is all too vague. And the younger people know still less about the subject. The need for these homely remedies arose, of course, from the inaccessibility of medical care to the farmers, woodsmen and laborers living in remote country districts. But the advent of the country doctor, the increased use of the radio, newspapers and magazines, the founding of reading clubs, the automobile and the construction of more and better roads have made their further use unnecessary. Unless recorded now, all knowledge of this fascinating subject and interest in it may well be lost forever.

The country doctor, unlike the physician practicing in large cities, who treats a presumably more enlightened and sophisticated group, is in a peculiarly fortunate position to observe and record these traditional practices. I have undertaken to describe how the people of New Hampshire, particularly in the central portion, have treated and, to some extent, continue to treat disease at home. I have obtained most of the material directly from them, and many of the quoted passages are verbatim accounts of what they have said.

It is hoped and urged that country doctors practicing in others parts of our country make similar observations and thus help to preserve that body of our national culture called Americana.

RESPIRATORY INFECTIONS

Obviously these people were interested in treatment, not in diagnosis. They knew what their

symptoms were, and they wanted relief from them. If the patient had a sore throat it did not matter to him whether he had diphtheria, septic sore throat or just plain sore throat. What he wanted was relief.

Considerable merit was attributed to a gargle made by steeping equal parts of elm bark, white-oak bark, sumac berries and blackberry root. Many preferred a gargle containing a mixture of brake root and whisky. Others acclaimed the virtues of kerosene, either "outwardly" or "inwardly" or both, that is, it might be rubbed on the outside of the neck or swished about in the throat. Gold beads or a gold chain worn around the neck still has vogue in the prevention and treatment of sore throat—and is also said to be useful as a prophylactic against and treatment for goiter. A dirty or used dark stocking worn around the neck served as a moral if not physical deterrent against colds "going down into the chest." An alternative method still widely used is to bind to the neck at bedtime a red flannel bandage with thinly sliced salt pork and thinly sliced onions, the whole sprinkled with black pepper.

Closely related to sore throat was so called "canker." This apparently meant any membrane in the buccopharyngeal cavity, no matter what its cause. For this condition an infusion of gold-thread was used as a mouth wash. The use of this herb was known to the Indians.¹ Brake root or sage tea was similarly used. Amber beads were worn to prevent croup, Castanea (chestnuts), dried bumblebees in molasses or just plain urine was used to cure croup. Sugar added to moss obtained from the north side of a maple tree was regarded as an excellent cough sirup. So were a sirup made of yarrow or of red clover and a drink made of eclecampane (sunflower). Red clover was supposed to be especially effective in whooping cough. A concoction called "Rob" and containing elderberries enjoyed wide use in this region. Fifty years ago, many people in the neighborhood gathered herbs for the Shakers of Canterbury. One

*Read before the Merrimack (New Hampshire) County and Center District Medical Society on July 10, 1940.
†Liberarian of staff, Franklin Hospital.

Thomas Corbett, "a properly trained physician," joined them and made a cherry pectoral. His name is on the label of the old blown bottles of Canterbury sarsaparilla.²

For "colds" in general there was the familiar catnip tea or that made from dried elder blossoms and peppermint leaves, but the most spectacular medicine was hard cider with cayenne pepper *à la* red-hot poker. "Men folks used to take hard cider, heat a poker red hot, while heating sprinkle the cider with cayenne pepper, then run the red-hot poker plumb into the mug of cider, causing it to boil and foam. This was drunk down as soon as the poker was taken out."

The herb, thoroughwort, is also called "boneset," a name derived from its use in the severe form of influenza called "break-bone fever." Elder-flower tea was considered infallible in the early stages of influenza. If it did not work, "you just weren't early enough in using it."

With regard to tuberculosis, the following story, which appeared in the July, 1939, issue of the magazine, *Yankee*, is of interest.

"You must be Ned's boy," an old man said to me once. "I knew your father. Yes, I knew your great-grandfather and all his family, and I'm going to tell you something that will surprise you."

"You probably don't know it, but if a family is dying off of consumption, the disease goes no farther after one of the members of the family has been buried face down."

"I was at the funeral of your great-uncle John. He died of old-fashioned consumption just as other members of the family before him. I was one of several who made up our minds to stop the run of consumption in that family, so we stayed in the cemetery until the relatives had gone, then we lifted the casket from the open grave and turned it over. So your great-uncle John was buried face down, and it ended consumption in that family."

In my opinion the following story from New Hampton is even better. The two daughters of a prominent farmer, Marshall Bowen, both contracted consumption. They tried everything known at the time, and finally went to the village witch, who told them that one girl was past saving, but that when she died, they should cut her heart out and bury it by Dickerman Brook. This would prevent the death of the other daughter. Tradition is vague as to whether this dictum was followed, but the other girl died of the same disease.

In the treatment of any lung disease—from a simple "cold in the chest" to pneumonia—it was and is still considered essential that the patient be well greased. And the favorite remedy for this purpose is skunk's oil, although Vick's Vapo-Rub is now running a "strong" second. No amount of arguing will convince these people

that these greases only make the patient messy, smelly and uncomfortable: "Why any fool knows that the greases strike right into the lungs and make the cough looser."

Skunk oil is obtained by catching a skunk in the fall, when it is "nice and fat." It is carefully dressed, particular care being taken not to disturb the scent gland. After skinning and removal of the viscera and scent gland, the carcass is slowly baked in an oven so that the fats are not burned. The oil cooks out and is caught in a vessel. It is sometimes taken internally as well as externally. Although skunk oil is widely used in the Bristol region, the folks around Wolfeboro prefer to use a baked-bean poultice, and in the Franklin neighborhood the flap-jack poultice is popular.

CARDIOVASCULAR DISEASES

Pipsissewa had a particular vogue in the treatment of heart disease. This beautiful plant, also known as "heart's ease" and brought over from England, was used to heal disease of the heart as well as the "broken heart." And garlic was eaten for its reputed effect of preventing high blood pressure and hardening of the arteries.

The following "Old Woman's Sure Cure for Dropsy" is handed down from old Dr. Stillings of Concord: "Take a little garden selendine, a little pipsissewa, a little gill [ivy] run over the ground, green of alder and white of hen dung. Slowly simmered over a slow fire and taken in copious draughts, this will produce such slushes of water and slugs of turd as ever your eyes have beheld."

FEVER AND THE "WATER CURE"

Standard treatment for fever was the use of sage or catnip tea, tea of pink or white yarrow, or compound spirits of lavender and ether. I have sometimes had trouble getting patients to take water when they had a fever. This is possibly the effect of the old adage, "Stuff a cold and starve a fever." I once had occasion to advise a ninety-year-old codger with urinary infection to drink plenty of water. As I was driving off I could hear him protesting to his daughter: "I know his kind. He's one of them goddam cold-water doctors!" Interestingly enough, I later learned that a cult of "water doctors" had practiced in the region. The so-called "water cure," a "method of treating infirmity and disease," was introduced in Concord by Dr. Timothy Haynes about 1850. He enjoyed a good practice for a time but disposed of his "institute" to Dr. William T. Vail, who ran it for three years and then in 1855 moved to Franklin

and soon after to Hill, where the institution had its remaining life.³

Speaking of the water cure, the following story may be of interest. A family of Robinsons lived on the old mountain road to North Sanbornton. One of the children developed rickets, whereupon some rustic sage told the mother that the way to cure the child was to take him down to Palmer Spring in the vicinity, and to dip him in the water nine times. The baby survived the ducking and the rickets.

NOSEBLEEDS

To prevent nosebleed a piece of red woolen yarn or a piece of nutmeg strung through two holes was worn around the neck. For children, bloodroot was hung over the foot of the bed. If the preventive measures did not work or if the patient failed to take them, nosebleed could be treated with fresh blossoms of red trillium held to the nose. For bleeding in general and nosebleeds in particular, cobwebs were widely used. The fine powder obtained from the puff ball mushroom after it had gone to seed was reputedly an excellent quencher of blood.

A patient from Franklin confidently states that she knew someone who took red clover for a fibroid tumor,⁴ under that treatment the "fibroid tumor became benign."

GASTROINTESTINAL DISEASES

For "stomach trouble" the people along the Pemigewasset River used to gather bloodroot on Sumner Island. For "heartburn, dyspepsia or indigestion" they used to "chew one teaspoonful of whole white mustard seed followed with a glass of water." Sassafras, camomile, wormwood and burdock teas were also used for stomach disorders. But hearken to this sound bit of advice on "dyspepsia" from *The Family Doctor or Guide to Health* (Boston: H. B. Skinner, 1844) lent me by the beloved octogenarian Jewell sisters, of Hebron, "Abstain from medicine and live upon a sixpence a day, and earn it, or rise with the sun, saw wood for half an hour, and breakfast upon a crust of bread."

Lobelia ("puke weed") was used to make one vomit and thus "clear off the liver." This explains why the recent attempt to revive the use of this herb—in the form of lobeline sulfate—to cure the smoking habit was so unpopular. "Turkey dung bitters, warmed," were used for the "jaundices." The people around New London preferred ironwood bark in the treatment of jaundice. The leaves and flowers of liverwort (hepatites) so called from the resemblance of its leaves

to the lobes of the liver, were used as a milder remedy for disorders of the liver. This use of vegetable medicines by reason of their real or fancied resemblance to the disorder or the part affected, the so called "doctrine of signatures," was firmly believed in by the Indians and the old English herbalists. The idea was that, by the mercy of God, many of the herbs made for the service of mankind were stamped with their characters, so that they could be read at a glance. Thus a plant with a wormlike stem was used as a vermifuge, and one with hairlike processes was used in the treatment of baldness.

In this region if anyone says he is "sick," it means that he is nauseated. Another term for nausea was "turn sickness." This usage harks back to the English ancestry of these people. I am told that in England the word "sick" is never used to indicate the state of being "ill" or "unwell." Their English origin probably also explains the fact that many of the natives, particularly those living away from the towns, address physicians as "Mister" rather than "Doctor." At first this apparent lack of respect annoyed me, but it was later pointed out that in addressing me as "Mister" their intention was to pay me the highest compliment of which they were capable. In England, of course, the regular practitioner is referred to as "Doctor," and the surgeon or superphysician is called "Mister."

Spearmint was regarded as specific for the treatment of nausea. For constipation rhubarb and senna were used. But it is not so well known that warm thoroughwort tea and a medicine made from the inner bark of the oil nut (hickory) tree were similarly used.⁴ The bark of some tree imported from Peru was supposed to have a laxative effect when stripped downward, but an emetic effect if stripped upward!

Perhaps the most widely used remedy for the "disentery" (diarrhea, "intestinal flu," "the runs" or "the trots") was blackberry root. But the astringent properties of the steepleoak bush, "hard tack" (leaves, roots and flowers), strawberry blossoms, sweet fern leaves and oak bark were put to similar use. Smartweed was regarded as especially good for "summer complaint." The following "cure for the disentery" is taken from the account book (1828) of Henry Hilton Chandler of Haverhill, through the courtesy of his great granddaughter. "Take one quart of hardwood ashes and one half gill of hardsoot from the brick of the chimney. Put to three quarts of hot water. Take from one half to a wine glassful two, three or four times per day." And finally I have it on good authority that green apples were also used

for diarrhea—not a far cry from the present-day, apple-pulp diet.

EXANTHEMATOUS DISEASES

To ward off contagious diseases a camphor bag was worn around the neck. This was regarded as particularly effective against scarlet fever and measles. Braided flax prevented scarlet fever and mumps. It was believed, and the belief is still widely held, that once one has contracted an exanthematous disease—in its pre-eruptive stage—the “rash must come out” and “the quicker it comes out the better”; otherwise it would “strike in,” and no end of dire consequences would ensue. Housewives still boast of the remarkable ends they go to in order to “bring out” the measles rash. The sovereign measures to ensure this favorable turn of events were the drinking of hard cider, of snake-root and saffron tea or of the celebrated “nanny-goat tea.” It is easy to understand how the vasodilatory effect of cider might make a measles rash more obvious. “Nanny-goat tea” or “lamb tea” or “nanny-pill tea” is simply a brew of sheep’s droppings. It is not clear to me why this heroic remedy was not also used to “clear off the liver.” The exact method of bringing out a measles rash seems to vary in different parts of the country. In writing of the poor whites in Florida in *The Yearling*, Miss Rawlings has Ma Baxter give Jody a mullein tea for that purpose.

Mumps “were” kept from “going down” by tying several strands of flax around a girl’s neck or a boy’s waist. Note that I said “mumps were” not “mumps was.” In this region mumps, measles, pulse and so forth are all considered plural. There are even some who call mumps on one side a “mump.”

URINARY “STOPPAGE”

A newborn infant delivered a few years ago in Groton was alleged by its mother not to have urinated for over twenty-four hours. She put a small bag of salt over the lower abdomen of the child and urinary function was promptly established. Shall we credit this mother, who had never heard of Pfeiffer or his work, with an uncanny ability to employ osmotic forces? “Punkinseed tea” is also used for failure to urinate.

CURE OF AN “INFIRMITY”

A child in the Mailbox Hill district of New Hampton was born with a “fissure”—where I do not know. An old man told the parents how to cure it. They were to go out to the wood lot and split an ash sapling near a brook so that the gap ran from north to south and so that the baby

could be passed through the tree. This they did, and the child gradually outgrew his “infirmary.” The tree is still standing.

“SPRING TONIC”

A rapidly disappearing old New England institution is the well-known spring tonic or general “toner up” of the system, a real event in the family life. In the spring the mind of the housewife turned to simples and bitters to be ready with “relief and benefit” for all who might need them. From the neatly bagged and labeled herbs hanging from the cross braces of her attic or shed, she would select the appropriate ones to make her favorite spring tonic. This varied somewhat in form but never in its qualities of bitterness and woe. The tonic ranged from sulfur and molasses, sage and India molasses, rhubarb and dandelions, through pipsissewa, wormwood with or without vinegar, thoroughwort, flowers of elder, poplar bark mixed with burdock and aloes to bloodroot. Adults preferred their own tonics sweeter and were not averse to their containing spirits in varying proportions. Dandelion wine was the prime favorite.

The following “blood medicine” was used as a “spring purifier”:

¼ lb. Burdock root	¼ lb. Spikenard root
¼ lb. Sarsaparilla root	¼ lb. Red-clover blossoms
¼ lb. Yellow root	1 handful Hops
¼ lb. Dandelion root	

These were stewed in 4 quarts of water until all the strength was extracted; then strained, with enough sugar added to taste, and stewed down to a sirup, when a half pint of brandy finished it off and made it ready for a tablespoonful dose three times a day.⁵

RHEUMATISM

Rheumatism was prevented by always carrying a horse-chestnut in the pocket, the efficacy of this device being satisfactorily proved by the fact that, after a few years of constant transportation, the chestnut became hard and dark from the absorption of the “rheumatic germs,” which would otherwise have attacked the transporter. An alternative was to carry in the pocket the bone from a raccoon’s penis.

For the relief of “rheumatic” joint pains a tea of the leaves of Canada thistle was drunk. For joint pains or sprains lard was heated in a skillet and a cupful of oats was added. When the oats began to pop out, the lard was applied locally as hot as could be borne. A poultice of mullein leaves boiled in vinegar was used for sprained

ankles. Catnip also relieved painful swelling, when applied in the form of a poultice. One old recipe book says "common ground worms simmered in lard is very effective in relaxing sinews that have been drawn up by disease or accident." And one man treats cramps in his legs by turning his shoes upside down under the bed.

EYES, EARS, 'MUMING,' TEETHING AND WORMS

For 'weak' eyes, gold earrings were worn. A tea of dried rose petals was used to bathe sore eyes, and rose water is still an important constituent of many of our present day eye washes. For sore eyes in infants, warm breast milk was milked directly from the mother into the baby's eyes. From New Boston comes a report of the use of urine for inflamed eyes.

There were several well known treatments for earache. One was to blow tobacco smoke into the offending ear. Another was to spit tobacco juice into it. A third was to instill warm pickerel juice into the ear canal. This juice is obtained by skinning a pickerel and hanging it in the window where the sun can get at it. The heat of the sun melts the layer of fat along its back, the fat draining into a bottle under the suspended fish. This oil is warmed before using. A hot baked potato or the roasted heart of an onion held against the ear was also considered valuable.

Food for children too young to chew was chewed by some fond parent or relative and then given to the baby. This was known as "muming."

In some families, children always wore a string of Job's tears round their necks during the teething period, these round seeds of an East Indian grass being famed as preventives of fever at this troublesome time. In Alexandria five years ago I noticed a child wearing a white strap around his shoulders crossing in the front and back of his chest, in figure-of-eight fashion. His mother explained that this was a "teething jacket." That was the only time I ever happened to see one, but an Indiana colleague tells me that the practice is quite common in the Middle West.

Every time a child was ill, but especially if he ground his teeth at night, he was considered to be suffering from "worms"—unless proved otherwise. And often he would promptly receive a dose of beef gall. A tansy bag was hung around his neck to "prevent the worms from coming up into his throat and choking him to death." A much boasted treatment for tapeworm infestation was to starve the patient, and incidentally the worms, for three or four days. Then a bowl of steaming hot soup was held at the patient's mouth. The worms, getting the odor of food, would come up and could be caught. It is not clear to me

why this did not choke the patient to death. Punkinseed tea was also used for tapeworms.

SKIN TROUBLES, WARTS AND CHILBLAINS

Among the remedies for the various skin diseases were sulfur and rum for boils, gunpowder in water or the "sweet" from a heated axe for ringworm, Elder Hook's—he lived in Loudon—balm for "running sore," yellow dock boiled in vinegar for athlete's foot and balm of Gilead buds fried in mutton tallow for bedsores. Wounds from rusty nails, were and still are, bound snugly with a thick slice of salt pork, which allegedly "draws like a plaster." White pine pitch or human urine was used for cuts and wounds. For poisoning due to snakebite, snake root was frequently used. A squish poultice was "laid on" for the bite of the water moccasin, whereas the cut surface of an onion was applied for the bite of the rattlesnake. The fact that in time the cut surface turned black was ample proof that the poison had "come out." Butter and flour is still the quick relief for ordinary burns, but around Andover a "fresh cow dressing" was long used for surface burns.

Woodsmen in this region are reputed to have eaten the leaves of poison ivy in the spring of the year to prevent ivy poisoning. This practice was said to have no injurious effect on the mucous membranes of the mouth or gastrointestinal tract, yet to produce a seasonal immunity of the skin to the poison. For victims of this weed, selendine or sweet fern was rubbed on.

For warts, mystic incantations and general hocus pocus were apparently much more effective than herbs. Many of the methods have a familiar ring. "Rub the wart with a bean and throw the bean away, rub the wart with salt pork and bury the salt pork, rub the wart with a used dish cloth and hide the cloth, tie it around with a string and bury the string." There is a lady in Lakeport who, out of the goodness of her heart, will buy your wart. She gives you a penny, you bury the penny, and, "presto chango," the wart is gone. But one old timer said, "They warn't nawthin better fer warts 'n t' rub 'em with selendine." Mike Ackerman, of Alexandria, had a method all his own. "He didn't even need to see his patient. He had only to know that someone had a wart. He then simply went into some sort of consultation with a hobgoblin or a brownie or the devil or something, and shortly thereafter the wart was cured. He cured Will Price of his wart while Will was way down in Massachusetts in the Melrose Hospital and Mike himself was still in Alexandria. He also cured Will's nurse of her warts at the same time."

To ease chilblains, these people used to put their shoes under the bed "so's they point toward the rud." Or they rubbed their feet with kerosene or turpentine or pigs-foot oil, or painted on oil of spike (lavender) with a feather. Or they cut an onion, salted it and rubbed the cut surface on their feet. Or they walked barefoot on a cold painted floor or in the snow.

HERB DOCTORS

Usually one person in a community became especially adept at the preparation and prescription of these herbs, and became known around the countryside as a good "herb doctor"—like "Aunt" Samuel Crosby, of Hebron, "Aunt Head," of Sandwich, and half-Indian "Doctor Dodge," of Groton. Very often the herb doctor and midwife were combined in one person. Some even became very successful quacks and competed with regular practitioners of medicine. Such a one was Samuel Thomson, who was born in Alstead in 1769. The peregrinations of this "traveling" doctor included Alstead, Walpole, Surry, Portsmouth, Hillsborough, Royalton, Warwick, Salisbury Mills and Exeter in New Hampshire, Eastham, Newburyport and Salem in Massachusetts, Woodstock, Jericho and Georgia in Vermont, and Kittery and Eastport in Maine. In the last-named town he boasted that he drove three of the five regular physicians out of practice. He sold "rights," that is, memberships in his so-called "Friendly Botanic Society," to his system of treatment, which he patented in 1813. His aim was to raise the "inward heat above the outward" by the use of lobelia, which promoted free perspiration, and cayenne pepper (capsicum); to "cleanse" the stomach by giving an emetic; and, when necessary, to use a steam bath followed by a concoction of bayberry, sumac, hemlock bark, witch-hazel leaves, red-raspberry leaves and marsh rosemary, or any two or three of these, to "clear the canker." He "cured" cancers with pipsissewa, and was greatly annoyed at the ingratitude of "cured" patients and his constant persecution at the hands of the regular members of the profession.⁷ In 1809 he was accused of killing a patient with lobelia.

THE HERB PROJECT

There has recently been a revival of interest in the cultivation of medicinal herbs in New Hampshire. To help recoup the fast-dwindling agricultural income of the state the Department of Agriculture established in 1936 an herb nursery at Pembroke, aided by a WPA "Medicinal Herb Project," to the best of my knowledge, the only one of its kind in the country. This agency grows and distributes among small farmers seedlings of herbs suited to New Hampshire culture and finds a ready market for the cultivated herbs. This season 48,000 herb plants were distributed to seventy-two growers in forty-seven towns. For practical purposes the state herb nursery concentrates on ten herbs, advising new growers to limit themselves to these: catnip, digitalis, peppermint, sage, spearmint and pyrethrum (perennials), and summer savory, winter savory, sweet basil and sweet marjoram (annuals). The following medicinal herbs can also be cultivated with profit in New Hampshire: rosemary, stramonium (Jimson weed), thyme and valerian.⁸

* * *

One may be amused at the faith that these people placed in the healing virtues of their herbs, but it is nonetheless true that modern research has substantiated many of the old ideas. After all, it was from old English folklore that Withering culled the idea that digitalis was useful in dropsy. And it is not at all inconceivable that some of the remedies listed above may have a like rationale.

REFERENCES

1. Sanford, S. N. F. *New England Herbs: Their preparation and use.* 55 pp. Boston: New England Museum of Natural History, 1937.
2. Weygandt, C.: personal communication.
3. Gallinger, J. H. The medical profession. *History of Concord.* 1477 pp. Vol. II. Concord, New Hampshire: The Rumford Press, 1903. Pp. 905-928.
4. Weygandt, C. *New Hampshire Neighbors: Country folks and things in the White Hills.* 368 pp. New York: Henry Holt and Co., 1937.
5. Rawson, M. N. Early simples and benefits. *Candle Days.* 307 pp. New York: D. Appleton Co., 1936. Pp. 85-112.
6. Johnson, C. *What They Say in New England.* 263 pp. Boston: Lee and Shepard, 1897. Pp. 116-122.
7. Thomson, S. *The Thomsonian Materia Medica.* Thirteenth edition. 834 pp. Albany: J. Munsell, 1841.
8. Baker, F. W. *Herbs That Can Be Cultivated for Profit in New Hampshire.* 12 pp. Concord, New Hampshire: State of New Hampshire, 1938.

DEFICIENCY DISEASES: THEIR DIAGNOSIS AND TREATMENT*

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SCURVY as a clinical problem supposedly disappeared decades ago from general medical practice. Pellagra, as a fully developed symptom complex, is rare in northern latitudes. Isolated symptoms clinically, pathologically and therapeutically indistinguishable from those of pellagra may be found in any hospital ward. Beriberi, supposedly a disease of only rice-eating populations of tropical lands, may be seen regularly in any large community.

The extent to which information gained from study of obvious deficiency disease may be applied to the problems of clinical medicine has not been realized. Many symptom complexes of previously unknown etiology, such as pernicious anemia and sprue, are now included under the heading of deficiency disease, and there is a constant tendency so to include an ever-increasing number of pathologic conditions.

Purely laboratory investigations of the effects of inadequate diet have given diverse and often conflicting results. Such a mass of contradictory data has appeared that the application of the results of animal experimentation to the problems of disease in human beings is uncertain.

The purpose of this report is to present a simple outline of deficiency diseases as they are seen in man, and to discuss certain principles on which their successful recognition and treatment depend.

DEFINITION

As employed in this report, the term "primary deficiency disease" is applied to those marked conditions that follow an intake of certain dietary constituents inadequate to maintain health in normal persons. It is, however, most important to recognize that deficiency disease may occur despite a diet sufficient for the average person. This occurrence is due to an increased demand for the essential dietary substances or to certain factors which interfere with their delivery at the site of their utilization in the form in which they are utilized. Symptoms like those of primary deficiency disease which occur despite a diet adequate for normal persons are termed manifestations of "secondary deficiency disease."

RECOGNITION OF DEFICIENCY DISEASE

The recognition of the characteristic symptom complexes of dietary lack such as beriberi, pellagra and scurvy is relatively simple. The clinical pictures are striking, and the improvement which follows the administration of the proper dietary compounds is dramatic.

A more serious clinical problem concerns the recognition of disease manifestations as due to a deficiency when the familiar complete symptom complex is not present and the dietary lack is not obvious. For example, it is held that the stomatitis and atrophic glossitis of pellagra differ in no respect, either morphologically or in their response to therapy, from the stomatitis and glossitis which occur in certain patients without dermatitis, diarrhea and delirium; and the peripheral neuritis of beriberi in the Philippines is symptomatically and therapeutically similar to the peripheral neuritis of alcoholism which is encountered in Bellevue Hospital.

Clinical and experimental evidence make it clear that almost every system of the body may be affected by a lack of essential food constituents. The different manifestations may be present together in a complete symptom complex such as pellagra or pernicious anemia. In other cases only certain components of the complex may appear independently, such as glossitis, combined system disease or diarrhea. These individual symptoms appear to respond to specific dietary therapy quite as well as the complex as a whole.

It becomes apparent that the degree of deficiency and the susceptibility of the patient are such potent factors that the manifestations of dietary lack may be exceedingly varied and difficult of recognition. The diagnosis of individual symptoms that appear in the absence of a complete disease complex is suggested by the morphologic similarity of the lesions to those seen in classic deficiency disease, and is confirmed by the response to specific therapy.

CAUSATION OF DEFICIENCY DISEASE

Improper diet as the cause of primary deficiency disease has been recognized since the time of the Crusades, and the dramatic results of the specific therapy of scurvy, of pellagra and of beriberi are among the most striking of modern medicine

*Presented at the annual meeting of the New Hampshire Medical Society, Manchester, May 15, 1940.

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Only recently has the more obscure secondary deficiency disease that occurs despite an adequate dietary intake been understood. It is with the varied manifestations of this condition that the clinician is concerned most frequently, and illustrative material can be obtained from a study of the disturbances of blood formation that result from a lack of certain food constituents.

This material can be employed because changes in hematopoiesis are sensitive indicators of effective therapy, and lend themselves to graphic representation. Neurologic changes, cutaneous alterations, lesions of the mucous membranes, disturbances of ocular function or even such a subjective factor as appetite could be employed, however, if quantitative methods for their estimation were available.

At least six different mechanisms are now known to exist by which secondary deficiency diseases may develop. These will be discussed in order.

The first is loss of essential dietary substances by diarrhea. Study of the symptomatology of the morbid states characterized by protracted diarrhea such as that accompanying ulcerative colitis, chronic dysentery and intestinal tuberculosis reveals that changes of the skin, of the mucous membranes and of the blood are frequently encountered (Mackie and Henriques¹). These changes are similar in all respects to the lesions of the same organs that are seen in deficiency disease due to obviously inadequate dietary intake. They are assumed to be caused by a simple loss of vitamins from the bowel, because they frequently disappear when the diarrhea is checked although other factors remain unchanged.

The second cause of secondary dietary deficiency is an interference with the absorption of essential food substances. This mechanism is seen particularly in conditions in which dysfunction of the intestinal tract has been a feature for a considerable period, as in sprue. As this disease progresses the hematologic response to orally administered therapeutic agents becomes progressively less, although the response to the same substances parenterally administered remains unchanged (Castle and his co-workers²).

The third cause is a failure of the body to convert dietary constituents into the form in which they may be utilized. Such a mechanism obtains, for example, in the secondary deficiency known as pernicious anemia. In this condition, as has been shown by Castle and his co-workers,³ there is failure by the stomach to secrete a ferment that is necessary to convert some dietary constituent similar in distribution to the water-soluble, heat-stable, vitamin B into the form that is required

for proper hematopoiesis. The result is precisely what would be expected if the dietary constituent to be converted in the intestine were withdrawn from the food, as shown by the experiments of Wills.⁴

The fourth mechanism is made operative by the inhibitory power of infection on the action exerted by the essential food constituents. This mechanism is seen very frequently in a mild form in infectious disease. One of the most striking effects may be evaluated quantitatively from the reticulocyte response in pernicious anemia (Smithburn and Zerfas⁵).

The fifth mechanism is a congenital requirement for an abnormally high intake of certain dietary factors. The extraordinary variability in the response of different persons to the same dietary lack has been a prominent feature of all deficiency disease. Only recently, however, has experimental proof been available. The work of Brown⁶ has shown beyond question that certain young rabbits are abnormal at birth and will inevitably die unless the diet is supplemented by large amounts of certain vitamins. When this is done the animals may be kept in perfect health, but if the unusually great intake of vitamins is discontinued, disease symptoms recur. It is inferred that similar individual variations of lesser degree are operative in the cause of deficiency states in human beings.

The sixth mechanism involves an increased demand for accessory food factors properly to detoxify certain poisonous compounds. As indicated by the evidence at hand, however, it appears that certain amounts of a toxic compound such as dimethylamidoazobenzol may be tolerated by a normal animal when fed a normal diet. If the content of the diet in certain vitamins (probably related to vitamin B) is decreased, symptoms promptly occur (Suguira and Rhoads⁷).

TREATMENT OF DEFICIENCY DISEASE

Certain fundamental principles are of the greatest importance in the treatment of the conditions under discussion, and unless these principles are observed the results are very frequently unsatisfactory. Four such principles will be here discussed.

The Threshold Requirement

In treating such conditions as pellagra and sprue, and at times pernicious anemia, clear evidence is at hand that a well-defined quantitative requirement for therapy exists. If less than the required amount is given, no response is obtained. Once the requirement is exceeded, however, even

if on only one occasion, a distinct effect can be detected.

Analysis of case records in which specific vitamin therapy is stated to have failed reveals that the commonest cause of failure is insufficient dosage. Because minute amounts of food constituents relieve experimental deficiency states in animals, it is assumed that similar amounts will be effective in man. This emphatically is not the case, and therapy must be pushed until the desired effect is produced.

The objection will be raised that overdosage of certain vitamins, for example, vitamin D, have been shown to be toxic to animals. This is undeniably true, but it is equally true that the margin between the therapeutic and the toxic dose is so great that it is doubtful whether overdosage of human beings can be effected except by intent.

Parenteral Administration of Therapeutic Agents

In view of the role of decreased absorption from the intestinal tract in the causation of deficiency disease, it is clear that treatment should be administered parenterally in case the oral route has given unsatisfactory results. Here again, pellagra, sprue and pernicious anemia afford striking proof. The studies of Castle and his co-workers⁸ in sprue have advanced unequivocal evidence that certain cases may be wholly refractory to oral treatment. Only by intensive parenteral treatment may satisfactory results be achieved.

Multiple Deficiency States

From the very nature of the manner in which deficiency disease develops, it is apparent that symptoms due to lack of only one specific food constituent must be rare. Dietary intake, if poor, is almost always low in several accessory factors, and if symptoms are due to vitamin loss rather than to insufficient intake, the same situation obtains. Successful treatment depends on supplying all the elements which are lacking. If, for example, a case of anemia due to lack of two substances such as liver extract and iron is treated by the administration of either substance alone, only a partial remission can be expected.

Use of Concentrated Vitamin Preparations

From experience it has been concluded that the use of highly concentrated and purified vitamin preparations is to be avoided. If the necessity of parenteral administration requires a concentrate, it should be supplemented by crude material given orally. Knowledge of the nature of vitamins and the effects of their lack is fragmentary, and only incomplete conclusions concerning human disease can be drawn from animal experimentation. The

preparation of concentrates invariably involves some loss of active material.

* * *

In conclusion, primary and secondary deficiency disease have been defined and their mode of production analyzed. Certain principles of treatment have been discussed. If the material here presented is effective in suggesting the possibility of deficiency disease as a cause of obscure symptoms encountered in clinical practice, I shall consider my report justified.

REFERENCES

1. Mackie, T. and Elenriques, M. Ulcerative colitis. *J. A. M. A.* 104:175-178, 1935.
2. Castle, W. B., Rhoads, C. P., Lawson, H. A. and Payne, G. C. Etiology and treatment of sprue: observations on patients in Puerto Rico and subsequent experiments on animals. *Arch. Int. Med.* 56:627-699, 1935.
3. Castle, W. B. Observations on the etiologic relationship of achylia gastrica to pernicious anemia. *Am. J. M. Sc.* 178:748-764, 1929.
4. Willis, L. Treatment of "pernicious anemia of pregnancy" and "tropical anemias" with special reference to yeast extract as a curative agent. *Brit. M. J.* 1:1059-1064, 1931.
5. Smithburn, K. C. and Zervas, L. G. The inhibitory action of infection and fever on the hematopoietic response in a case of pernicious anemia. *Ann. Int. Med.* 4:1108-1111, 1931.
6. Brown, W. H. Hereditary constitutional peculiarities and dietary deficiencies. *Tr. Coll. Phys. Philadelphia* 2 (Series 4) 139, 1934.
7. Sugawara, K. and Rhoads, C. P. Experimental liver cancer in rats and its inhibition by rice-bran extract, yeast and yeast extract. *Am. J. Cancer* (in press).
8. Castle, W. B., Heath, C. W. and Strauss, M. B. Observations on the etiologic relationship of achylia gastrica to pernicious anemia. *Am. J. M. Sc.* 182:741-764, 1931.

DISCUSSION

DR. SIMON STONE, Manchester: We all should be grateful to Dr. Rhoads for the excellent summary he has given us in the use of vitamins in medicine. We all use vitamins, and sometimes I wonder if we are not using too much of them. After hearing Dr. Rhoads's paper, I believe that perhaps I have not been using enough. I should like to emphasize again the need of using the entire complex, instead of a small part of it.

Dr. Rhoads did not say much about vitamin E. Probably that was for a definite purpose. Vitamin E has come into use in the last two years. Its discovery was made by Evans in 1922, and reported in *Science*. He found that in certain cases of sterility it could be supplied by the addition of certain foodstuffs to the diet. In 1927 he published a book which is probably a landmark in vitamin therapy called *The Anti-Sterility, Fat-Soluble Vitamin E*. It dealt with the sterility in rats that could be produced by depriving the animal of vitamin E and could be cured by the addition of it. Evans mentions paralysis of young rats, which developed after their mothers had been deprived of this vitamin. A year later he published another paper with Burr, dealing with paralysis in young rats suckled by mothers deprived of vitamin E. This work remained forgotten for a time, but within the last two or three years Evans has devoted himself to paralysis in animals, and also in human cases, in which vitamin E deficiency is considered to be one of the major causes. Within the past year, Wechsler published a paper dealing with the use of vitamin E, in animals and in human beings, for lateral sclerosis, in which vitamin E deficiency is considered to be one of the major causes.

In April, 1939, we began an investigation at the Balch Hospital on the use of vitamin E in muscular dystrophies. We have treated about 20 patients so far, and in about 10 of them have obtained excellent results. In the past, cases

with muscular dystrophy were considered to have a poor prognosis. Various diets have been given, as well as injections of aminoacids, thyroid adrenalins, without producing satisfactory results. Some of our patients who had considerable difficulty in getting around are now walking quite well. We have also noted definite changes in the musculature of these patients. Previously the muscles were fatty and flabby and had no tone; since then their condition has changed to normal.

There are other conditions in which vitamin D or B probably is important, such as tabes dorsalis and possibly some other types of muscular atrophy. We are investigating some of the uses of vitamin E in such conditions, through the assistance of the Venereal Control Department and the Crippled Children's Services.

I should appreciate it very much if Dr. Rhoads could tell us about the recent advances in the work with vitamin E.

DR. HAROLD D. LEVINE, Bristol: I should like to ask Dr. Rhoads if he can say anything about the significance of a coated tongue.

DR. EZRA A. JONES, Manchester: I should like to ask Dr. Rhoads if he is using vitamin D for delayed union in fractures.

DR. FRANK N. ROGERS, Manchester: In addition to the question on coated tongue, I should like to include one on the type of tongue known as the geographic tongue. Is that condition related to an avitaminosis? Also, should massive initial doses of vitamin D be given for the cure of rickets?

DR. RALPH W. HUNTER, Hanover: I should like to ask Dr. Rhoads if there are any toxic effects from overdoses of vitamin B. Also, does brewer's yeast contain all the factors of vitamin B?

A PHYSICIAN: I should like to ask Dr. Rhoads about the effectiveness of large doses of vitamin D in psoriasis.

DR. RHOADS: As to the question regarding vitamin E in lateral sclerosis: Of course, everyone was highly excited by Wechsler's contribution to this subject. I believe that the group at the New York Hospital have been pursuing the matter with some intensity, but I personally have not had any experience with it. I think that the work just mentioned here is one of the most clear-cut studies of which I have heard. Certainly, so far as New York is concerned, an insufficient number of cases have been treated to warrant any conclusion.

An answer to the question concerning coated tongue must be somewhat speculative, I think. In some cases, coated tongue represents a very early stage of acute glossitis. We have followed a number of cases of coated tongue through to the peeling off of the surface and the leaving behind of the red, beefy, atrophic epithelium; this suggests that at least one form is a manifestation of deficiency disease.

As to the use of vitamin D in nonunited fractures, no more can be done with this vitamin, so far as I know, than to make it possible for the patient to absorb calcium. The latter may be decreased by a variety of disorders of the intestinal tract, hence vitamin D is extraordinarily useful in treating secondary calcium deficiency by supporting the absorption of calcium. I have had no practical experience with the problem of ununited fractures, but from the experimental work, I am inclined to think that I should treat any cases of delayed union with

enough vitamin D to ensure proper absorption of calcium. But calcium must be given too. The giving of vitamin D will not result in the absorption of calcium that is not there.

Geographic tongue is a very interesting condition, but I do not know very much about it. People with pernicious anemia are likely to have it. I have been inclined to believe, with others, that it occurs in patients with the abnormal mucosa that may result in pernicious anemia, if the strain is severe enough. I do not believe that this condition, as ordinarily described, can be cured by the vitamin B complex. However, it is sometimes associated with atrophy of the tongue, which can be cured readily.

As to the use of vitamin D in rickets, one of my patients with this disease is now taking 200,000 units of vitamin D a day. He simply does not absorb it normally; hence he does not absorb calcium. In the classic studies, as high as 1,000,000 units a day has been given for a week to get proper calcium levels. As with all these vitamins, it must be given in sufficient quantities to obtain the desired effect. No rule for dosage can be laid down, because there are so many other factors involved. If one wishes to cure rickets, one must give enough vitamin D, as well as calcium and phosphorus, to obtain normal levels. Of course massive doses can be toxic, and the patient must be closely watched.

As to the toxic effects of vitamin B complex, I have had a certain number of patients complain of jitters and dizziness with heavy doses of vitamin B₁ (up to 100 mg. a day). I have known other physicians who have complained that their patients had similar symptoms. I do not believe that these are serious. Of course 100 mg. a day is a large dose, and in my experience it is given only rarely.

I know of no dose of riboflavin that is toxic. I have never given more than 20 mg. a day for two weeks, so that I am not in a position to judge its toxicity. I have given animals 500 mg. a day without toxic effect.

Nicotinic acid will, in many patients, give a distinctly toxic reaction in the form of flushing, palpitation and a feeling of pressure in the pit of the stomach. I do not know why it does not do this all the time. The irregular effect is a problem. I doubt if one needs to give the compound to the point of toxic symptoms. With continued heavy doses of nicotinic acid, certain patients lose weight and become quite sick. This is a danger which one must consider. There is an overdosage factor, beyond question, but I do not believe that it results in permanent damage.

As to brewer's yeast, I should say that its success depends on the way it is prepared. If it is oxidized by exposure to the air some constituents are lost. If it is boiled long enough, the vitamin B₁ element will of course be destroyed. Practically, brewer's yeast does contain all the factors described, provided it is a good quality of yeast and is properly prepared. This is true of Fleischmann's 2040, for example. It has a completely adequate supplement to basic diets in animals, and, so far as we know, it contains all the factors. I do not believe that all yeasts are of the same quality. The whole question is difficult, indeed, because yeast is hard to take. We are now trying to provide a yeast that can be taken and is effective. The evidence is clear that in yeast many factors are needed and cannot so far be obtained from a bottle sold by the drug houses.

As to psoriasis, I have not seen any striking cures brought about by vitamin D. I certainly am not satisfied that vitamin D is specific for psoriasis, but I am glad to accept the evidence as it appears. Physicians at the Mayo Clinic assure me that they have had dramatic cures of

psoriasis They give doses of vitamin D that ought to be toxic, but they say they are not. I should not dare give as much of it as they do. They say that they watch the blood calcium carefully, and have had cures in a large number of cases. I have not had enough personal experience to warrant any statement.

While I am on the subject of vitamin D, it might be worth while mentioning that the various reports that are appearing concerning the cure of arthritis by this vitamin are not substantiated, at least in my experience. I have never seen any case of arthritis cured by any vitamin.

HOW MAY THE GENERAL PRACTITIONER DIAGNOSE CANCER OF THE UTERUS?*

FRED L. ADAIR, M.D.†

CHICAGO

THERE are several reasons why the recognition and the treatment of cancer of the uterus are important. Cancer is one of the great killers of mankind. It occupies first rank, being second only to cardiovascular disease. It is very frequent in the breasts and uteri, women being particularly susceptible to this disease. When neglected by patient or doctor, cancer grows beyond control, and marches rapidly to irrevocable, intolerable suffering and death. If detected and properly treated early in its course, health and life may be prolonged, and the natural life span may be completed. It is important to realize that cancer is a curable condition, and that, as in other diseases, the percentage of favorable results obtained depends on early diagnosis and appropriate treatment.

We are here concerned with cancer of the uterus, which occurs in the age groups above twenty-five. It is of various cellular types, which occur with varying frequency at different sites. The usual sites are the vaginal portion, the endocervix and the corpus of the uterus. Some state that in 100 cases about 85 occur in the portion, 10 in the corpus, and 5 in the endocervix. Others believe that about 17 per cent of uterine cancer occurs in the corpus. My own relatively small series shows 50 per cent of uterine carcinoma in the corpus—an unusually high incidence. Primary carcinoma of the vagina is relatively uncommon, although it is frequently seen as an ultimate complication of carcinoma of the cervix.

It is often difficult to determine whether the primary site is in the upper part of the cervix or in the lower part of the corpus. One can classify

these cases only very early in the course of development. It is, therefore, often difficult to tell whether or not those cases occurring in the region of the isthmus uteri are primarily corpus or cervix carcinomas. It is much easier, of course, to differentiate cervix and corpus carcinoma when the site is in the region of the external os or low in the cervix, or in the corpus of the uterus at a level higher than the isthmus. Microscopically, some of these cases should be differentiated by the type of epithelium, although cases of squamous cell carcinoma have occurred in the endocervix and also in the corpus. It is fair to state that pure squamous cell carcinoma and adenocarcinoma with mucous secretion are usually cervical in origin. The differentiation of cases that develop primarily in the upper portion of the cervix or the lower portion of the corpus is not so important clinically, since they are usually of analogous types and behave similarly. In cervical carcinoma, the corpus of the uterus is usually not enlarged unless there is some stenosis of the cervical canal leading to the formation of a hemiometra or a pyometra, or unless there are some complicating neoplasms such as fibromyomas.

For many reasons it is important to reach some general agreement relative to the different stages of cancer of the cervix uteri. Unless some distinction is made and recognized between the different cases, it is impossible to evaluate the results of treatment and also to determine which is the best treatment for the different stages and types of carcinoma. The reports of the results of radiotherapy in cancer of the uterine cervix by the League of Nations College‡ in 1938 give certain definitions as approved in the year 1937. These

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League of Nations Health Organization, *Ann. of Report on the Results of Radiotherapy in Cancer of the Uterine Cervix*, Vol. 3, Results Obtained in 1932 (Cited in 1938), 149 pp., London: Allen and Unwin, 1939.

are modified somewhat from those approved in 1929, and are as follows:

Stage I

The carcinoma is strictly confined to the cervix.

Stage II

The carcinoma infiltrates the parametrium on one or both sides, but has not invaded the pelvic wall: *Stage II, Parametrium*. The carcinoma infiltrates the vagina, but does not involve its lower third: *Stage II, Vagina*. Endocervical carcinoma, which has spread to the corpus: *Stage II, Corpus*.

Stage III

The carcinomatous infiltration of the parametrium has invaded the pelvic wall on one or both sides; on rectal examination, no cancer-free space is found between the tumor and the pelvic wall: *Stage III, Parametrium*. The carcinoma involves the lower third of the vagina: *Stage III, Vagina*. Isolated carcinomatous metastases are palpable on the pelvic wall (irrespective of the extent of the primary cervical growth): *Stage III, Isolated Pelvic Metastases*.

Stage IV

The carcinoma involves the bladder, as determined by cystoscopic examination or by the presence of a vesicovaginal fistula: *Stage IV, Bladder*. The carcinoma involves the rectum: *Stage IV, Rectum*. The carcinoma has spread outside the true pelvis (below the vaginal inlet, above the pelvic brim, distant metastases): *Stage IV, Distant Spread*.

The general rules to be observed according to this report are as follows:

When allocating a case to a stage nothing but facts revealed by examination should be taken into account. The stage of each case should be decided upon examination prior to treatment, and this classification should remain. The classification should be postponed quite exceptionally and the reasons stated. When it is doubtful to which stage a given case is to be allocated the earlier stage should be chosen. The fact that a single case presents two or more of the conditions which characterize a single stage does not affect this statement.

The summary of the report, which is the third of the series, includes statements from six radiotherapeutic centers. The data from these different centers have been combined and together furnish information concerning 9061 patients who suffered from cancer of the uterine cervix, of which 7958 or 87.8 per cent were treated by radiation therapy. Table 1 shows the results obtained after the lapse of five years of this treatment.

Various attempts have been made to grade, on the basis of microscopic examination, both carcinoma of the cervix and carcinoma of the corpus. This grading has not proved to be entirely satisfactory and is not of great interest to the ordinary practitioner of medicine. About 5 to 10 per cent

of the carcinomas of the cervix are of glandular, and the remainder are of the squamous-cell type. Practically all corpus carcinomas originate from the glandular epithelium. It must be borne in mind, however, that all cancers are not equally malignant.

No entirely satisfactory basis has yet been obtained by which one can prognosticate the ultimate outcome of a case of cancer. The most satisfactory basis for prognostication is the extent of the carcinoma when it is first seen. Not all types are equally amenable to treatment by radiation ther-

TABLE 1. *Results After Five Years of Radiation Therapy.*

STATUS OF PATIENT	NO. OF CASES	PER CENT
Alive without recurrence.....	2194	27.6
Alive with recurrence (including those operated on after failure of radiotherapy)	128	1.6
Died of cancer	5368	67.5
Died of intercurrent disease.....	163	2.0
Lost sight of.....	105	1.3
Total	7958	

apy. In general, it may be said that the less mature the cells and the less the degree of differentiation the more radiosensitive the cancer. Those that are more slowly growing, with the maturer type of cells, are more radioresistant.

Of approximately 75,000 women who die annually of cancer, about 16,000 may be expected to die of cancer of the uterus. Statistics show that of women who reach the age of thirty, about 1 in 37 may be expected to die of cancer of the uterus. This hazard increases until about the age of fifty, after which it declines with the increased age attained by the woman. The age decade in which the disease is most frequent is that from forty to forty-nine, although the group between fifty and fifty-nine is a close second. Carcinoma of the corpus occurs more frequently between fifty and sixty, whereas carcinoma of the cervix occurs oftener between forty and fifty. However, one should realize that any woman after the age of twenty-five is subject to carcinoma of the cervix and of the uterus.

The mere fact that a woman has not borne children does not exclude this possibility, since approximately 10 per cent of the carcinomas of the cervix occur in nulliparous women, which is not particularly disproportionate to the total number of women in this age group who have not been pregnant. It should also be recognized that complicating conditions do not exclude carcinoma of the uterus. Carcinoma occurring during pregnancy is not particularly common, but apparently occurs about once in 7000 or 8000 pregnant women. Also, fibromyomas of the uterus do not exclude the possibility of a carcinoma either of the cervix or of the corpus. I have found about 2 per cent of

uteri with fibromyomas in which there was a complicating carcinoma. Thirty-eight per cent of cases of carcinoma of the corpus have fibroids. Furthermore, one must remember that when an incomplete hysterectomy has been performed, the cervix is liable to become the site of a carcinoma. It not infrequently happens that a carcinoma of the cervix may exist at the time of the removal of the corpus of the uterus and may be discovered subsequently. In the diagnosis of carcinoma of the uterus, therefore, it is important to bear in mind that these conditions mentioned above do not exclude the possibility of a carcinoma either of the cervix or of the corpus of the uterus. Precautions should be taken to make a diagnosis, particularly when an operation is to be performed for some plastic or other procedure, and especially in those cases in which the decision has to be reached relative to removal or retention of the uterus. In 1 per cent of the cases of incomplete hysterectomy, carcinoma of the stump is discovered subsequently. Statistics show that the increased mortality in total hysterectomy over incomplete hysterectomy does not warrant the former, in view of the low incidence of carcinoma of the stump. The five-year survival of carcinoma of the stump is 14 per cent, and of the cervix 22 per cent.

The diagnosis of carcinoma of the uterus is made on the basis of the history and the physical examination, but for a diagnosis the patient must report to the physician. Consequently, it is part of the physician's duty to his patients and community to stress the fact that any unusual symptoms associated with or originating from the uterus, such as irregular or profuse bleeding,—no matter in what period of life,—should be investigated and the cause determined.

The most significant symptom to which the patient's attention should be directed is any abnormal genital bleeding. This may consist in interval bleeding, profuse menstruation, prolonged menstruation, a short interval between menstrual periods, contact bleeding or recurrence of bleeding following the menopause. It seems to be a frequent impression among the laity, and not an uncommon one among physicians, that disturbances of menstruation or recurrence of the menstrual flow following its cessation in the menopausal period are symptoms that may be anticipated as a part of the normal climacterium. This is not a safe basis on which to stand, either for the patient or for the physician, and any case of postmenopausal bleeding should be studied carefully to determine whether or not there are any organic changes, particularly those associated with

the development of early cancer. It is, therefore, the early diagnosis that one should stress. In the early diagnosis, palpatory findings, bimanual examination and speculum examination are of the utmost importance. I have frequently seen women who have reported previously to physicians and have not been examined, with the result that cancer has been overlooked for the time being. Therefore, the first essential that should be kept in mind by the practicing physician is that any such woman seeking medical advice must have a physical examination, including examination both with the fingers and with the speculum. Admitting that it requires considerable experience to detect early lesions and to be certain that they are cancerous, it is ordinarily not very difficult to detect a suspicious lesion on the cervix, when the case should be referred to someone who is more experienced than the practitioner for diagnosis, or a biopsy should be made and the tissue subjected to microscopic examination.

What conditions on a cervix may confuse the diagnosis of early carcinoma? The commonest lesion is erosion, with or without laceration of the cervix. Another is a polyp or papillary growth. The so-called "Nabothian cysts" are not ordinarily confused with a carcinomatous nodule. Small ulcers on the cervix also occur, sometimes in association with and sometimes independent of cervical erosion. The patient may report that she noticed a slight blood stain following intercourse or the taking of a douche. Such a patient should be carefully examined. One may find on the cervix a small lesion that bleeds easily on contact. If a polyp is present, it should be removed and subjected to microscopic examination. Malignant polyps are relatively rare; however, one not infrequently finds a cervical polyp associated with a carcinoma of the corpus, and in such cases the bleeding may be thought to be due to the former whereas it arises in the latter. Bleeding papillary growths and noncystic nodules should be removed for microscopic examination.

The so-called "Schiller test"—the application of an aqueous solution containing 0.3 per cent iodine and 0.7 per cent potassium iodide—may reveal a suspicious area. If an unstained area shows with this test, there is always a possibility of a cancer. The Schiller test depends on a quality of the squamous epithelium for absorbing iodine and taking a mahogany stain, whereas a cancerous area may remain unstained. The greater the experience of the observer, the more valuable a special test, such as this, becomes. It should not, however, be falsely interpreted. Nonmalignant as well as malignant lesions fail to stain with iodine, owing

to the absence of glycogen. The Hinselmann colposcope gives one an enlarged picture of this area, which has to be interpreted by the observer as the lesion would when observed with the naked eye. Neither of these procedures enables one to make a positive diagnosis of cancer. They merely point out suspicious areas.

In obtaining biopsy specimens the practitioner should be careful to secure an adequate piece of tissue, including the suspicious area or a portion of it, and also including some normal tissue on either side of the suspicious area if it is not too large to be thus excised. The early stages often present difficulties from the standpoint of both gross and microscopic diagnosis. It is, therefore, important that the microscopist know exactly the source of the tissue and have a specimen adequate for examination. There are many confusing pictures in tissue removed from the cervix, and one who is expert should make the microscopic diagnosis. Accuracy depends not on the microscope, but on the skill and ability of the one making the diagnosis.

The recognition of lesions of the endocervix and of the corpus of the uterus is more difficult, because these areas cannot be visualized. The symptoms are about the same, and consist in abnormal bleeding. Contact bleeding is less common from lesions in the endocervix and in the body of the uterus. Interval bleeding is common in both, but perhaps more so in lesions of the endocervix. Corporeal lesions are more inclined to produce profuse or prolonged menstruation, or recurrence of the menstrual epoch following the cessation of menstruation. Early in the course of carcinoma these lesions of the corpus and of the endocervix produce few, if any, gross physical findings.

When an endocervical lesion is suspected from the history, a probe or cotton applicator passed into the cervical canal will reveal some roughness, possibly excavation or possibly stenosis or contact bleeding. If such evidence is found, it may be necessary to secure a biopsy specimen with a sharp curette introduced into the cervical canal, by which sufficient tissue for microscopic examination can be secured. The palpatory findings may be significant by revealing an area of peculiar hardness, except in cases of papillary carcinoma, when the growth is unusually friable. In some cases a fine probe passed into a suspicious area produces a parchmentlike resistance.

Malignant lesions of the corpus are even more obscure, and produce no visual and practically no palpatory findings in their early course. There is virtually no asymmetry or enlargement of the uterus in the early stage. These occur only after

the process has advanced to a considerable degree. The only means of making an early diagnosis is by the use of diagnostic dilatation and curettage, which should be resorted to quite freely in suspicious cases. In my series of cases curetted for suspicious corporeal bleeding, there was microscopic evidence of carcinoma in approximately 16 per cent, and approximately 4 per cent of these were without any evidence of cancer on physical examination. In moderately advanced cases, of course, there is enlargement or asymmetry of the uterus, and in cases that are still more advanced there may be some fixation and spread to the surrounding tissue, with evidence of induration and lymphatic involvement. One should strive for early rather than for late diagnosis.

The recognition of late or advanced cancer presents little difficulty. The pain, discharge and bleeding are more or less characteristic. Physical examination may reveal definite physical findings in and about the cervix of the uterus that make the diagnosis relatively easy to determine. Other conditions that come under consideration are the granulomatous lesions due to syphilis, tuberculosis or other venereal diseases. Relatively speaking, the importance of diagnosis of late uterine cancer is of little significance because the outlook for cure is bad, and although some of the unpleasant symptoms may be eliminated and life somewhat prolonged, the possibility of cure is relatively remote.

The symptom of pain in cases of late carcinoma has unfavorable prognostic significance. Also symptoms referable to neighboring structures, such as the bladder and rectum, occur in advanced rather than early cases. Cachexia, which used to be stressed as a diagnostic sign, is largely a misnomer; it is in no way peculiar to cancer, but is the result of blood loss, infection and interference with the nutritive processes and other important functions of the body.

The treatment varies with the site, type and stage. Practically all agree at the present time that radiation therapy is the preferential form of treatment for carcinoma of the uterus. Whether or not this should be supplemented by surgery depends on the stage of the case when it is first recognized, and on the services available for radiation therapy and surgical methods. Two types of surgical procedure may be used: first, radical treatment, which includes the extensive removal of all actually and potentially involved parts; secondly, adjuvant treatment, which supplements radiation therapy by procuring better radium application or by removing involved structures that are not accessible or susceptible to radiation therapy. These questions usually have to be settled by the

expert in the management of carcinoma of the uterus. However, the practitioner should be conversant with some of the methods to be used, and should advise the patient accordingly, after making the diagnosis.

A protest should be voiced against the indiscriminate employment of radium and deep x-ray therapy by those who are not versed in their use. Improperly used these agents become either ineffective or dangerous or both. Their value depends

on their proper use and not on the radioactive agent itself.

The general practitioner is often the first to be consulted in cases of uterine cancer. He should make a diagnosis and see that appropriate treatment is instituted without delay. Every week lost in making a diagnosis and in instituting treatment reduces life expectancy and lessens the chances of cure.

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HERPES ZOSTER: LOCAL ANESTHESIA IN THE TREATMENT OF PAIN

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HERPES zoster is a disease of unknown etiology that may occur alone or in combination with a wide variety of diseases of the spinal cord or posterior root ganglia. The disease is characterized by severe pain in the distribution of one or more nerve roots and the appearance of tense vesicles on a highly inflammatory base in the area innervated by these roots.

Evaluation of the treatment of herpes zoster is extremely difficult on account of the variations in the severity and duration of the pain, and the site and destructiveness of the local lesions. In children the disease is usually mild, and sequelae are rare; in older people, however, relatively minor skin lesions may be accompanied by severe, excruciating neuralgic pains that persist for many months or years after the skin lesions have disappeared.

The present-day treatment of herpes zoster consists in local therapy to the skin lesions, medication for the relief of pain, and medical or physical therapy directed toward a cure of the inflammatory process in the posterior root ganglia. Treatment of the local lesions with dressings or poultices should be avoided, since they are apt to increase the incidence of secondary infection. A simple calamine lotion or a dry antiseptic dusting powder is useful. The results with local anesthetic ointments are in general disappointing.

Specific therapy of the inflammatory process in the posterior root ganglia has not yielded any striking results. Among the therapeutic agents that have been tried are posterior pituitary extract (Sidlick¹ and Niles²), x-rays (Vignal,³ Keich-

line⁴ and Pillsbury and Fondé⁵), sodium iodide (Ruggles⁶ and Pillsbury and Fondé⁷), sulfapyridine (Sutton and Sutton⁸), foreign-protein, and ultraviolet or infrared light. Although many of the above methods of therapy were used with the hope of relieving pain, the rationale behind most of them was to produce an amelioration of the inflammatory process in the posterior ganglia.

Treatment of the pain of herpes zoster has usually been with drugs of the coaltar series, morphine and codeine have been avoided because of the danger of addiction. Rosenak⁹ reported relief from pain and regression of the vesicles after intravertebral and paravertebral injections of 0.5 per cent aqueous procaine solution, and Hollander⁹ in 1938 showed that an oil-soluble anesthetic could be injected subcutaneously in the hyperalgesic areas with prompt relief of the pain, without recurrence when the anesthesia wore off four weeks later.

It is the purpose of this article to report the results of the treatment of 15 unselected cases of herpes zoster by the method of Hollander.

MATERIAL AND TECHNIC

Most of the patients received injections of 0.5 to 2.0 per cent novocain, with or without adrenalin. Three preparations of anesthetic oil were used: Nupercain (Ciba), Hollander's formula and the following modification of Hollander's formula:

Benzocaine	3
Benzyl alcohol	10
Phenol	1
Oil of sweet almond	q s ad 100

The areas of hyperesthesia were mapped out by the usual methods (pinprick, brush or pinching). These areas were cleansed with 95 per cent al-

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cohol, and infiltrated subcutaneously with the therapeutic agent until there was total anesthesia. The smallest-gauge needle possible (novocain, 25; oil, 21 to 22) was introduced at the periphery of the predetermined area of hyperesthesia, and small quantities of the anesthetic agent were deposited in the tissues in a fan-shaped manner to underlay the entire hyperalgesic area. When vesicular, papular or pustular lesions were present, the anesthesia agent was injected immediately under the inflammatory tissue. The criterion for successful injection was complete loss of all cutaneous sensation in the injected areas. The absence of nerve block was indicated by the fact that anesthesia was confined to the area injected. Care was taken to see that the oil did not pool in small areas by massaging lightly after the injection was made.

RESULTS

Results were considered satisfactory when the anesthesia produced by the injection was accompanied by complete relief of the pain. Local therapeutic measures were avoided except for the protection from infection. The usual duration of anesthesia from novocain was from one to two hours, and that from the oil solution about one week.

Fourteen patients were injected with novocain, with complete relief of pain immediately after the injection in 13 (Table 1). The duration of this relief varied from one to thirty or more hours,

had been complete relief of the pain from the novocain injection, and in the remaining 2 further treatment was refused. There was complete relief of the pain in 7 of the 9 patients injected with the oil anesthetic. One patient (Case 14) was entirely free of pain for six months but later developed postherpetic neuralgia, and another (Case 15) suffered an increase in the pain after the injection and developed postherpetic neuralgia. Local reactions to the injection of the anesthetic oil were soreness, redness, swelling and pain at the site of the injection. Two patients experienced mild chilly sensations, and there was a possible febrile reaction in 1 (the temperature was not recorded). The duration of these side reactions varied from a few to forty-eight hours, and they were controlled by local applications of heat or analgesics by mouth. No accumulation of oil or abscesses occurred. In 2 patients there was a local infiltration at the site of the injection for as long as three weeks.

The results on the whole, were encouraging. Relief from the acute attack was experienced by 13 of the 15 patients treated. Ten of 13 patients followed for a period of six to twenty-one months were permanently relieved of all discomfort. There were 3 failures, 1 with novocain and 2 with a combination of the two anesthetic agents. In the first patient (Case 13) the injection of the novocain produced an increase in the pain, and in the second (Case 15) injection of the anesthetic

TABLE 1. Results of the Treatment of Herpes Zoster with Novocain and Anesthetic Oil.

CASE NO.	AGE	SITE OF LESION	DURATION OF HERPES	DURATION OF RELIEF		PERIOD OBSERVED	FINAL RESULT
				AFTER NOVOCAIN INJECTION	AFTER ANESTHETIC OIL INJECTION		
	yr.		days			mo.	
1	59	Intercostal	10	1 hour	Permanent	17	Permanent relief
2	56	C 7	6	Permanent	—	17	Permanent relief
3	65	N V 1st Div.	5	Permanent	—	9	Permanent relief
4	18	Intercostal	5	Permanent	—	18	Permanent relief
5	15	D 12	4	—	Permanent	21	Permanent relief
6	37	D 1	7	1 hour	Permanent	15	Permanent relief
7	20	N V 2nd Div.	7	Permanent	—	17	Permanent relief
8	15	Intercostal	3	1 hour	Permanent	8	Permanent relief
9	68	Intercostal	3	30 hours	Permanent	6	Permanent relief
10	52	D 1 + D 2	4	42 days	Permanent	20	Permanent relief
11	33	Intercostal	5	6 hours	—	0	Satisfactory
12	30	Intercostal	3	9 hours	Permanent (?)	1/4	Permanent relief (?)*
13	65	Intercostal	35	0 (worse)	—	9	Postherpetic neuralgia
14	65	Intercostal	60	2 hours	6 months	12	Postherpetic neuralgia
15	60	Intercostal	21	5 hours	0 (worse)	3	Postherpetic neuralgia

*Patient did not return for further observation.

after which pain recurred with equal or greater severity in all but 4 patients. Reactions to novocain were limited to slight local soreness and tenderness on pressure. In one patient (Case 13), the pain was made worse by the injection of novocain.

Eight of the 14 patients injected with novocain and one other (Case 5) were subsequently treated by injection of the anesthetic oil. Four patients did not receive the latter treatment because there

oil produced an exacerbation of the pain, although temporary relief from the pain had been obtained previously with an injection of novocain. A satisfactory response to both anesthetics was noted in the third patient (Case 14), but complete relief of all discomfort for a period of six months was followed by a classic postherpetic neuralgia.

The clinical course of the skin lesions was not affected. Regression of the vesicles occurred in

the expected seven to fourteen days.⁷ Postherpetic neuralgia occurred only in patients of the older age group (sixty to sixty-five years). Two cases (not included in this series) of classic postherpetic neuralgia failed to respond to this method of treatment.

Although relief of the pain was the main object of these injections, it was gratifying to note that loss of the pain was accompanied by amelioration of muscular disabilities, improved appetite, normal sleep and ability to return to work in several patients.

SUMMARY

Local anesthesia produced by subcutaneous infiltration of the hyperalgesic areas with novocain or oil soluble anesthetics produced a relief from the pain in 13 of 15 patients with acute herpes zoster. The duration of the relief after the injection of novocain was usually from one to thirty

hours, following which there was a recurrence of the pain. Seven of the 9 patients receiving the combination of novocain and oil solution experienced permanent relief of the pain.

The clinical course of the skin lesion was not altered.

Postherpetic neuralgia developed in 3 patients
818 Harrison Avenue

REFERENCES

- 1 Sidel D M The use of solution of p tuitary in herpes zoster
Arch Dermat & Syph 22 91 93 1930
- 2 Niles H D Herpes zoster report of a case of the palm and two fingers and fifteen other cases treated with p tuitary
New York State J Med 32 73 7 1932
- 3 Vignal W Tra cements p ystherp ques du zona et de ses sequelles
do laureuses *Par s med* 13 3 1929
- 4 Le chl ne J M Sixty two cases of herpes zoster successfully treated with x rays
Radiology 22 3 2374 1934
- 5 Pillsbury D M and Fonde G H The treatment of herpes zoster
M Clin North America 20 239 251 1936
- 6 Ruggles E W Apparent specific effects of sodium iodide in herpes zoster
Arch Dermat & Syph 23 4 24 6 1931
- 7 Sutton R L and Sutton R L Jr *Diseases of the Skin* Tenth edition 1549 pp St Louis C V Mosby Co 1939 P 84
- 8 Rosenak S Procaine in ecto on treatment of herpes zoster *Lancet* 2 1056 1058 1938
- 9 Hollander E Dependence of sensation of pain on cutaneous impulses
Arch Neurol & Psychiat 40 743 747 1938

A STUDY OF VITAMIN C NUTRITION IN A GROUP OF SCHOOL CHILDREN

Clinical and Laboratory Studies*

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THE observation of clinical evidence of vitamin C deficiency in a number of children in Maine during 1937 and 1938 aroused the concern of the director of the State Bureau of Health about the prevalence of vitamin C deficiency in the State. Studies of the foods produced and marketed in various parts of Maine had also suggested to the head of the Department of Biology of the Maine Agricultural Experiment Station the desirability of obtaining information concerning the food habits and the state of vitamin C nutrition of the population.

This study was undertaken to determine the state of vitamin C nutrition of a group of children attending an elementary school in a Maine village. Most of the children in this school were of French-Canadian extraction, and it should be pointed out that the results of the survey are applicable only to this one group.

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MATERIAL AND METHODS OF STUDY§

Eighty six children were studied in the autumn of 1938 and again in the spring of 1939. These children were unselected except for age and sex, so that there is no known reason why the state of nutrition of the group should be expected to differ from that of the population of 700 in the school as a whole. The group included 39 boys and 47 girls, ranging in age from seven to sixteen years. In general there were a few more girls than boys in each age group.

Physical examinations were made during the autumn survey. With the exception of the mouth conditions to be discussed later, no physical signs of vitamin C deficiency were recognized. Because of the difficulties involved in attempting to assess

§The authors express their appreciation to Miss Mary M. Clayton of the Maine Agricultural Experiment Station for advice and assistance with respect to technical methods; to Miss Elizabeth F. Murphy of the same station for assistance in the interpretation of dietary findings; to Miss Elizabeth M. Waters, nutrition consultant in the Division of Maternal and Child Health of the State Bureau of Health for the collection of data relative to the diets of the children; and to the personnel of the school in which the study was made and to the local representatives of the State Bureau of Health without whose wholehearted cooperation the study would not have been possible.

the general nutritional status and to correlate it with specific findings, the physical examinations were not repeated in the spring.

In the autumn and again in the spring the study of the 86 children included examination of the blood to determine the level of ascorbic acid in the plasma and examination of the gums by a dentist for clinical evidence of vitamin C deficiency. Furthermore, tests of tolerance to a dose of ascorbic acid were made on the urines of 49 children, and the therapeutic value of vitamin C in improving inflammatory conditions of the gums was tested in 41 children.

In interpreting the data obtained, caution is necessary because of the incomplete state of present knowledge as to the metabolism of vitamin C and the exact significance of specific values for vitamin C in blood plasma or urine, and also because of the limitations inherent in the analysis of a relatively small sample.

RESULTS OF STUDY

Examination of the Blood

Determination of the plasma-ascorbic acid values was by titration of macroscopic samples of plasma with indophenol.* Under the conditions of the present study, it was impracticable to make the determinations on fasting subjects, but the children were questioned regarding the foods eaten

TABLE 1. Values of Ascorbic Acid in the Blood Plasma of 86 Children Examined Both in the Autumn and in the Spring.

ASCORBIC ACID IN PLASMA mg./100 cc.	AUTUMN EXAMINATION		SPRING EXAMINATION	
	NO. OF CASES	PER CENT	NO. OF CASES	PER CENT
0.00-0.19	10	12	20	23
0.20-0.39	29	34	34	40
0.40-0.59	20	23	19	22
0.60-0.79	14	16	2	2
0.80-0.99	6	7	2	2
1.00-1.19	6	7	2	2
1.20-1.39	1	1	6	7
1.40-1.59	—	—	1	1

that day; only 7 of the 86 children in the autumn and 16 in the spring had eaten citrus fruit or tomato on the day of the test. For these children it is possible that the plasma-ascorbic acid values obtained may indicate a state of vitamin C nutrition superior to that which actually existed.

The results of the autumn and spring determinations of plasma ascorbic acid are shown in Table 1. The lower limit for values indicating satisfactory vitamin C nutrition has generally been considered to be in the neighborhood of 0.80 mg. per 100 cc.¹⁻⁶ The majority of the children studied — 73 (85 per cent) in the autumn and 75 (87 per

cent) in the spring — had values below this level.

Plasma-ascorbic acid levels below 0.40 mg. per 100 cc. have usually been found to be associated with vitamin C undernutrition.^{1, 2-5} Most of the values obtained were in this relatively low range; 39 children (46 per cent) in the autumn and 54 (63 per cent) in the spring had values below 0.40 mg. per 100 cc. The total number of children who had relatively low values (less than 0.40 mg.) was considerably greater in the spring than in the autumn, whereas the number who had intermediate values (between 0.40 and 0.79 mg.) was smaller in the spring.

Because certain investigators believe that clinical manifestation of scurvy may occur in the presence of plasma-ascorbic acid values of 0.15 mg. per 100 cc. or less,^{1, 4} it is worthy of note that the 10 chil-

TABLE 2. Association between Autumn and Spring Values of Ascorbic Acid in the Blood Plasma.

ASCORBIC ACID AT AUTUMN EXAMINATION mg./100 cc.	NO. OF CASES	ASCORBIC ACID AT SPRING EXAMINATION			
		0.00- 0.39 MG.	0.40- 0.79 MG.	0.80- 1.19 MG.	1.20- 1.59 MG.
0.00-0.39	39	24	10	1	4
0.40-0.79	34	23	7	2	2
0.80-1.19	12	7	3	1	1
1.20-1.59	1	—	1	—	—
Totals	86	54	21	4	7

dren who had values below 0.20 mg. in the autumn, and the 20 children who had values in this range in the spring, actually had values of 0.15 mg. or less, yet none of them showed the classic signs of the disease.

Table 2 shows the association between the values obtained in the autumn and those obtained in the spring. It is possible to see from this table the extent to which the children maintained relatively constant levels of ascorbic acid in the blood, or showed a rise or a fall in ascorbic acid values.

Of the 39 children who in the autumn had low plasma-ascorbic acid values (below 0.40 mg. per 100 cc.), 24 still had values within this range in the spring, and 15 had higher values (10 between 0.40 and 0.79 mg., 1 between 0.80 and 1.19 mg., and 4 of 1.20 mg. or more). Of the 34 children who in the autumn had intermediate values (between 0.40 and 0.79 mg.), 23 had dropped into the low group by spring, 7 remained at the same general level, and only 4 had values that fell into higher groups.

Twenty-four children, or 28 per cent of the entire group, had low values (below 0.40 mg. per 100 cc.) for ascorbic acid in both autumn and spring. In addition, 23 children, or 27 per cent, had intermediate values (between 0.40 and 0.79 mg.) in the autumn that dropped into the low group by spring. Therefore, 55 per cent of the 86 children had either

*The technic used was that published by Ingalls,⁷ with slight modifications by Miss Mary M. Clayton, of the Maine Agricultural Experiment Station. Potassium cyanide was used in some of the first determinations made in the autumn but was omitted in all later determinations.

relatively low values at both examinations or slightly higher values in the autumn that had dropped to relatively low values by spring.

Only 2 of the 86 children had ascorbic acid values of 0.80 mg. per 100 cc. or higher at both autumn and spring examinations.

In the light of present knowledge of their significance, these values may be summarized as follows: Approximately 55 per cent of the 86 children had values of ascorbic acid in the blood plasma that are usually associated with vitamin C undernutrition—nearly 28 per cent were in the relatively low group in both autumn and spring, and about 27 per cent, who were in the intermediate group in autumn, had dropped into the low group in spring. Only 2 of the 86 children had plasma-ascorbic acid values both in autumn and in spring that indicated satisfactory vitamin C nutrition.

Tests for Vitamin C Tolerance

To check the evidence obtained from the plasma-ascorbic acid tests against another method for estimating vitamin C nutrition, tests of tolerance to a test dose of ascorbic acid were made on the urine.

Both urinary tolerance tests and plasma-ascorbic acid tests were made on each of 49 children—23 were from the group of 86 unselected children previously described, and 26 were others from the school selected because of specific mouth findings—to determine to what degree the tolerance test would confirm the evidence given by the plasma-ascorbic acid values concerning the state of vitamin C nutrition of the group.

The procedure used in the urinary tolerance test was as follows:

Urine was collected with special precautions for preservation of vitamin C during a control period of six hours on the first day, and the amount of ascorbic acid contained in the specimen was determined by titration with indophenol immediately at the close of the period. Plasma ascorbic acid was determined on the same day. The ascorbic acid excretion during a similar six-hour period was determined on the second day, but at the beginning of the period of collection the child was given 400 mg. of crystalline ascorbic acid by mouth. The excess excretion of ascorbic acid during the second period as compared with the first was considered to be the amount of the test dose that was excreted in the six hours following administration.

The results of these tests on the 49 children are shown in Table 3. Examination of the table shows that the 28 children who had plasma-ascorbic acid values of less than 0.40 mg. per 100 cc. excreted relatively small proportions of the test dose. Twenty-four excreted less than 2 per cent of the dose, and the other 4 excreted less than 10 per cent. In contrast, the 4 children with plasma levels of 0.80 mg. per 100 cc. or above excreted more than 10 per cent of the test dose, in some

cases more than 30 per cent. Without attempting to attach clinical significance to the excretion of any specific amounts of the test dose, it is apparent that the results of the urinary tolerance test tend to

TABLE 3. Association between the Value of Ascorbic Acid in the Blood Plasma and the Percentage of the Test Dose of Ascorbic Acid Excreted in the Urine.

ASCORBIC ACID IN PLASMA mg./100 cc.	NO. OF CASES	TEST DOSE EXCRETED IN THE URINE					
		0-19%	20-49%	50-69%	70-89%	90-99%	100%
0.60-0.39	28	24	4	—	—	—	—
0.40-0.29	17	8	4	2	3	—	—
0.80-1.19	3	—	—	1	—	1	1
1.20-1.59	1	—	—	—	—	1	—
Totals	49	32	8	3	3	2	1

confirm the evidence obtained from the plasma-ascorbic acid values as to the state of vitamin C nutrition of this group of children.

Examination of the Mouths

The mouths of the 86 children were examined by one of us (P. W. W.) in both autumn and spring. Examination did not reveal the markedly swollen, spongy or bleeding gums that are generally recognized as typical signs of frank scurvy, but a milder degree of inflammation of the gums was frequently observed.

Inflammation of the oral mucosa was observed most frequently on the labial aspect of the upper jaw, less frequently on the buccal aspects of the maxillas and the labial aspect of the mandible, and least frequently on the lingual and palatal aspects.

To stabilize the recording of oral inflammation and to make possible the detection of changes in the manifestation of the inflammatory reactions, standards for recording the extent of the inflammation were set up, and the inflammation was classified as slight, moderate or extensive.* When, as

*The cardinal signs of inflammation as manifested in the mouth were the determining factors in classifying the findings. Erythema was the commonest sign, and edema as manifested by swelling and a spongy feeling was nearly as frequent. The tumor of edema was distinguished from the firm swelling characteristic of hypertrophy and of hyperplasia. Questioning a child for pain proved to be unimportant. No attempt was made to rate color. The first symptom of oral inflammation along with one or more of the points mentioned above, was the loss of the normal supple on the surface of the epithelium, manifested by a smooth glossy appearance, with distinct high lights reflected.

If the inflammation was limited to the interdental papillae in the embrasures so that triangular regions of inflamed tissues were seen to be isolated from the affected tissue of an adjacent embrasure, the extent of inflammation was regarded as slight. The islands of oral inflammation presented themselves in the interdental papillae in any locality of the mouth.

If the inflammation progressed from the interdental papillae into the continuous mucous membrane covering the alveoli, so that the evidences of the reaction were found not only in the embrasure but also in the tissues of the crest of the ridge, it was regarded as moderate. In other words, the reaction had in these cases extended from the interdental papillae up into the mucous membrane covering the alveolar ridges so that the swollen tissues became contingent over the necks of the teeth. When the edematous tissues measured approximately 2 mm in the direction of the long axis of the tooth, the limit of the moderate reaction was reached.

If the inflammation extended from the alveoli beyond the limits set up into the moderate reaction so that the greater portion of the gum tissue was involved and the gums presented a marked inflammatory aspect, it was regarded as extensive.

Although this procedure was developed independently, it has many points of similarity with that of Hinkle.¹

often happened, the extent of the inflammation varied in different parts of the same mouth, the greatest extent present was chosen as the basis for

TABLE 4. *Condition of Gums of 86 Children Examined Both in the Autumn and in the Spring.*

CONDITION OF GUMS	AUTUMN EXAMINATION		SPRING EXAMINATION	
	NO. OF CASES	PER CENT	NO. OF CASES	PER CENT
No inflammation	54	63	42	49
Inflammation (all degrees)	32	37	44	51
Slight	17	20	28	33
Moderate	11	13	12	14
Extensive	4	5	4	5

classification. To permit later study, for each oral examination a detailed description of the condition of the entire mouth was written, and any dental caries observed was recorded on a chart.

Table 4 shows the distribution of the children

TABLE 5. *Association between the Condition of the Gums in the Autumn and the Condition in the Spring.*

CONDITION OF GUMS IN AUTUMN	NO. OF CASES	CONDITION OF GUMS IN SPRING			
		NO INFLAMMATION	Slight	Mod-erate	Exten-sive
No inflammation	54	35	15	3	1
Inflammation					
Slight	17	5	10	2	—
Moderate	11	1	3	6	1
Extensive	4	1	—	1	2
Totals	86	42	28	12	4

according to the presence or absence of inflammation of the gums and the extent of inflammation.

At the time of the autumn examination, slightly more than one third of the children had inflam-

tum and 12 in the spring — had inflammation of moderate degree, and about 5 per cent (4 children) had extensive inflammation.

A comparison of the extent of inflammation noted in the 86 children in the autumn with that observed in the same children in the spring is shown in Table 5. Thirty-five (41 per cent) of the children were free from inflammation at both examinations. Twenty-five (29 per cent) who had inflamed gums in the autumn also had inflamed gums in the spring. In addition, 19 children (22 per cent) who had healthy gums in the autumn had developed inflammation by spring. Altogether, therefore, a total of 44 children, slightly more than half of the group, had inflamed gums at the time of the spring examination.

If vitamin C deficiency is a cause of the inflammation of the gums observed in these children, one would expect that inflammation would be found more frequently in children with low plasma-ascorbic acid values than in those with higher values. The comparison of the distribution of plasma-ascorbic acid values with the distribution of inflammation of the gums would be more satisfactory if it had been possible to make the examinations of the mouths in the autumn nearer the time of the blood examinations than was done in some cases. In the spring the two examinations in all cases were made within, at most, seven days of each other, but in the autumn in many cases there was an interval of fourteen to twenty-seven days (in a few cases twenty-eight to thirty days) between the two examinations, so that it is possible that the state of vitamin C nutrition of some of the children may have changed in the interval.

TABLE 6. *Association between the Value of Ascorbic Acid in the Blood Plasma and the Condition of the Gums.*

CONDITION OF GUMS	No. OF CASES	ASCORBIC ACID IN PLASMA			
		BELOW 0.40 MG. IN AUTUMN AND SPRING	0.40 MG. OR ABOVE IN AUTUMN AND BELOW 0.40 MG. IN SPRING	BELOW 0.40 MG. IN AUTUMN AND ABOVE IN SPRING	0.40 MG. OR ABOVE IN AUTUMN AND SPRING
Inflammation in autumn and spring	25	11	7	4	3
Inflammation in spring but not in autumn.....	19	7	4	5	3
Inflammation in autumn but not in spring.....	7	3	3	—	1
No inflammation in autumn and spring.....	35	3	16	6	10
Totals	86	24	30	15	17

mation of the gums of some degree; in the spring about half had such inflammation. The extent of the inflammation was most frequently slight; slight inflammation was observed in 17, or 20 per cent, of the children in the autumn and was even commoner in the spring, when it was noted in 28, or 33 per cent. In both the autumn and the spring 13 or 14 per cent — 11 children in the au-

There is, nevertheless, evidence of an association between the presence of inflammation of the gums and low plasma-ascorbic acid levels.

In Table 6 the children are classified in four groups: those who had low plasma-ascorbic acid values (below 0.40 mg. per 100 cc.) in both the autumn and spring; those who had values of 0.40 mg. or above in the autumn but low values in the

spring; those who had low values in the autumn but high values in the spring; and those who had values of 0.40 mg. or above at both examinations. For each of these groups are shown the number of children who had inflammation of the gums at both examinations, the number who had inflammation in the spring but not in autumn, the number who had inflammation in the autumn but not in spring, and the number who were free from inflammation at both examinations.

If an association exists between the level of ascorbic acid in the plasma and the presence or absence of inflammation of the gums, this should be best demonstrated by a comparison of the frequency with which inflammation was observed to be present or absent at both examinations in the two groups that offer the sharpest contrast in terms of plasma-ascorbic acid levels, namely, the 24 children who had low values in both autumn and spring, and the 17 children who had high values at both examinations. These groups are small, but they are fairly clear-cut in terms of plasma-ascorbic acid values. Of the 24 children with consistently low ascorbic acid values in both the autumn and spring, only 3 children were free from inflammation of the gums at both examinations; of the 17 children with consistently high ascorbic acid values, 10, or 59 per cent, were entirely free from inflammation. Inflammation was observed both in autumn and in spring in 11, or nearly half, of the children with low ascorbic acid values, and in only 3, or not quite one sixth, of those with high values.

Effect of Vitamin C Therapy on Inflammation of the Gums

To obtain further evidence of the apparent association between vitamin C undernutrition and inflammation of the gums, a therapeutic test with

TABLE 7. *Extent of Inflammation of the Gums before and after Vitamin C Therapy Given to 41 Children.*

EXTENT OF INFLAMMATION BEFORE THERAPY	NO. OF CASES	EXTENT OF INFLAMMATION AFTER THERAPY			
		NONE	SLIGHT	MODERATE	EXTENSIVE
Slight	16	8	8	—	—
Moderate	19	5	12	2	—
Extensive	6	—	2	1	3
Totals	41	13	22	3	3

vitamin C was given in the spring to 41 children who showed such inflammation. Twenty-six were from the group of 86 examined in both the autumn and the spring who could best be depended on to co-operate in the test, and 15 were other children who had inflamed gums. Table 7 shows the association between the mouth findings before and after therapy. Six children showed ex-

tensive, 19 moderate and 16 slight inflammation at the beginning of the test. Each child was supplied with tablets containing 50 mg. of crystalline ascorbic acid, with instructions to take 4 tablets daily. Between nineteen and twenty-one days after the therapy was started, the mouths were re-examined. Twenty-eight, or about two thirds, of the 41 children showed improvement in the condition of the gums, and 13 of these were free from inflammation. In 13, or about one third of the children, the extent of the inflammation was unchanged after therapy. No child showed an increase in the extent of the inflammation.

Since inflammation of the gums was observed more frequently in children with consistently low plasma-ascorbic acid values than in those with consistently high values, and since improvement in the extent of the inflammation was observed within only three weeks in approximately two thirds of the 41 children who were given vitamin C therapy, it may be concluded that vitamin C undernutrition is in all probability an important factor in the causation of this type of inflammation.

The observation of inflammation of the gums in 44, or slightly more than half the children, examined in both the autumn and spring (the 25 who had inflammation of the gums at both examinations and the additional 19 who had developed inflammation by spring) suggests that there was a high incidence of vitamin C undernutrition in the group.

Evaluation of Diets

Information obtained concerning the diets of a number of children in the school (76 in the autumn, 63 in the spring) showed that during both autumn and spring very few of the children ate foods that are sources of vitamin C frequently enough to provide an adequate intake of the vitamin. A good source of vitamin C* was eaten with an average frequency of once daily by not more than one child in seven at either season. At least half the children (43 of 76 in the autumn, and 32 of 63 in the spring) did not eat even a fair source of the vitamin, other than potato, oftener than once a day, and about one sixth (14 in the autumn, and 10 in the spring) did not eat such a food more than twice during the week for which diet records were kept. A detailed study of the diets and of the vitamin C content of the foods commonly used is to be published separately.⁸

COMMENTS

It is recognized that there are certain limitations in the information regarding vitamin C nutrition

*Foods considered good sources of vitamin C were citrus fruits, tomato, cabbage and turnip (rutabaga).

that can be obtained from a single determination of plasma-ascorbic acid value. The level of ascorbic acid in the blood is apparently influenced much more rapidly by variations in the vitamin C intake than the stores of the vitamin in the tissues are. The error from this source is probably less, however, in the study of a group than in the study of the individual, since in a group there is the possibility that a variation from the usual diet in one subject will be counterbalanced by a variation in the opposite direction in another subject. In the present study the results have been further stabilized by basing the conclusions on two determinations of plasma ascorbic acid on each child, with a considerable time interval between the determinations.

The comparison of the results of the urinary tolerance test with the results of the determination of the plasma-ascorbic acid level indicates that, although there may be a few cases in which the results of the two tests give somewhat contradictory evidence of the state of vitamin C nutrition, the general picture presented for a group of children is much the same in both tests.

The possibility has been pointed out that for some of the children the plasma-ascorbic acid values obtained may have been influenced by foods containing vitamin C that were eaten on the day of the test. In the spring it is also possible that some of the children had had an unusual amount of citrus fruit in their diets during the few days immediately preceding their tests, because the Federal Surplus Commodities Corporation had distributed grapefruit to the families of about half the 86 children two days after the time at which the examinations were started. In either event the results obtained from the tests would be unduly high and would result in underestimation rather than overestimation of the prevalence of vitamin C undernutrition in this group of children.

The comparison of plasma-ascorbic acid values with mouth findings has shown that inflammation of the gums was present more frequently in children who had consistently low levels of ascorbic acid in the plasma than in those who had higher levels. It is to be expected that there would be cases in which inflammation of the gums was present and the plasma-ascorbic acid level was not low, and conversely, cases with low plasma-ascorbic acid values and no inflammation, since the inflammation, if due to vitamin C deficiency, is probably the result of a long-continued deficiency, whereas the plasma-ascorbic acid value may be temporarily higher or lower than the usual level as a result of recent variations from the ordinary diet. Individual exceptions, therefore, do not detract from the evidence of an association between

inflammation of the gums and low plasma-ascorbic acid values. This evidence is materially strengthened by the improvement in the condition of the gums observed in two thirds of the children given a therapeutic test over a short period. Although deficiency of vitamin C appears to be an important causative factor in the production of inflammation of the gums of the type observed, there is no evidence that it is the only factor. It may well be that other conditions, such as poor mouth hygiene and other types of nutritional deficiency, also play a part in the production.

Since it was found in the autumn and again in the spring that about 55 per cent of 86 children had plasma-ascorbic acid values that are usually associated with vitamin C undernutrition, and that inflammation of the gums, probably due in part at least to vitamin C deficiency, was noted in about 51 per cent (both in autumn and in spring in approximately 29 per cent of the children and in the spring alone in an additional group of about 22 per cent), it appears that a considerable number of the children in this group were vitamin C deficient during that part of the year when relatively few home-grown fruits and vegetables are available. That many more of these children were probably on the borderline of inadequate vitamin C nutrition is indicated by the finding that only 2 had plasma-ascorbic acid values at both examinations that are considered to indicate adequate vitamin C intake, and that at neither examination did more than about 15 per cent of the children have such values. These findings do not, of course, give any information of the vitamin C level during those months of the year when home-grown fruits and vegetables are relatively plentiful.

The frequent finding of inflammation of the gums in these children and the evidence that this inflammation is associated with vitamin C undernutrition seem to indicate that for many of the children in the group there had been a deficiency in vitamin C intake sufficient to cause recognizable impairment of physical well-being.

SUMMARY

A study of the status with respect to vitamin C nutrition of a group of 86 children chiefly of French-Canadian extraction, attending an elementary school in a Maine village, was made during those months of the year when relatively few home-grown fruits and vegetables are available. The results of this study indicate that a considerable number of these children were undernourished with respect to vitamin C, as is shown by the following findings.

Examination of the blood showed that of the 86 children, 55 per cent had relatively low values

(less than 0.40 mg. per 100 cc.) for vitamin C in the blood plasma. Twenty-eight per cent had low values both in autumn and in spring, and 27 per cent had slightly higher values (0.40 to 0.79 mg.) in the autumn but low values in the spring. Such low values have usually been found to be associated with vitamin C undernutrition. Only 2 of the children had values that were high enough both in autumn and in spring to be considered evidence of adequate vitamin C intake (0.80 mg. or above). A comparison of plasma-ascorbic acid values with the results of urinary tests for vitamin C tolerance in 49 children lends support to the reliability of plasma ascorbic acid values as an indication of the state of vitamin C nutrition.

Examination of the mouths of the same 86 children showed that the 29 per cent who had some degree of inflammation of the gums in the autumn also had some degree of inflammation in the spring, and about 51 per cent (an additional 22 per cent) had inflamed gums in the spring. This

inflammation was found to be more frequent in children with consistently low values (less than 0.40 mg. per 100 cc.) for plasma ascorbic acid than in those with consistently high values, and the condition was observed to improve in approximately two thirds of 41 children with inflamed gums who were given vitamin C therapy for three weeks. Vitamin C deficiency, therefore, appeared to be a factor in the production of the inflammation of the gums observed in these children.

REFERENCES

- 1 Ingalls T. H. Studies on the urinary excretion and blood concentration of ascorbic acid in infantile scurvy. *J. Pediatr.* 10:577-591, 1937.
- 2 Abt A. F. and Farmer C. J. Vitamin C pharmacology and therapeutics. *J. A. M. A.* 111:1555-1565, 1938.
- 3 Greenberg L. D., Rinehart J. F. and Phatak N. M. Studies on reduced ascorbic acid content of the blood plasma. *Proc. Soc. Exper. Biol. & Med.* 35:135-139, 1936.
- 4 Kajdi L., Light J. and Kajdi C. A test for the determination of the vitamin C storage. *Vitamin C index.* *J. Pediatr.* 15:197-218, 1939.
- 5 King C. G. The physiology of vitamin C. *J. A. M. A.* 111:1098-1101, 1938.
- 6 Magnusson A. E. and Osterberg A. E. Determination of ascorbic acid in blood and urine. *Proc. Staff Meet. Mayo Clin.* 13:00-02, 1938.
- 7 Hanke M. T. *Diet and Dental Health*. 236 pp. Chicago University of Chicago Press, 1933.
- 8 Murphy E. A study of vitamin C nutrition in a group of school children: dietary evaluation. *J. Nutrition* (in press).

MEDICAL PROGRESS

TREATMENT OF BILIARY-TRACT DISEASE

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SUCCESSFUL treatment of biliary tract disease resolves itself essentially into an attempt to safeguard known physiologic functions or to replace such functions as have been lost or temporarily disturbed. Except for strictly surgical procedures directed at the removal or drainage of focal infection in the biliary tract, such physiologic considerations are of primary therapeutic importance and form the basis of successful surgical, as well as medical, maneuvers. The treatment of serious intrahepatic disease is by no means the forlorn hope that it was formerly thought to be. A reasonable optimism is becoming increasingly evident in the treatment of hepatic disorders, owing to the knowledge that more or less specific remedial measures exist that if properly applied may at least restore a fair degree of function, even if a complete cure is not possible. The regenerative powers of the liver are well known, and it is essential to recognize the reason for such optimism, which is based on the more recent knowledge available concerning measures designed to supplement or replace many of the multiple functions

of this organ. It is also important to differentiate measures that are strictly protective against damage to the liver and those that are effective in aiding repair once damage has been produced by one or another noxious agent.

Avoidance of specific toxins still constitutes a fundamental approach to the problem of liver disease, and reference may justifiably be made to various reports of liver damage due to substances encountered in the routine treatment of other diseases or to industrial hazards. In spite of its well known toxicity, chloroform continues to be a source of hepatic damage. An interesting article is that by Townsend,¹ who reports 2 cases of acute yellow atrophy following the administration of chloroform in pregnancy. Of particular importance is the fact that in each case the toxic effects of the anesthetic were in all probability enhanced by starvation and dehydration secondary to prolonged vomiting, prior to the administration of the drug. The untoward effect on the liver of a too-enthusiastic use of the barbiturates is not generally recognized, and an article by Scheffely and Higgins² properly directs attention to the toxic

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effect of these drugs in the presence of liver damage. These authors studied the effect of several preparations used as hypnotics or as anesthetics in the presence of partially hepatectomized animals, and their findings strongly suggest that the intact liver is necessary in protecting against the action of pentobarbital sodium (Nembutal) and ethyl-o-ethylphenylurea. These and similar findings may well explain many of the unpleasant and sometimes serious disturbances occurring after the use of excessive amounts of such preparations in depleted patients or in patients suffering from biliary-tract disease.

A renewal of interest in the use of acacia as a means of maintaining normal plasma osmotic pressure relations makes it important to call attention to recent experimental work with this material. Among other articles, one by Hall, Gibson and Weed³ shows that the intravenous administration of gum acacia in dogs resulted in evident interference with the carbohydrate and serum-protein functions of the liver as evidenced by changes in the tolerance curves of glucose and galactose and by a fall in the plasma fibrinogen content. The bleeding time was prolonged, and it was noted that blood clots were small and fragile. Such findings confirm the observations of previous investigators that gum acacia may cause serious damage to the parenchymal cells of the liver and that its therapeutic use warrants careful scrutiny. The use of thorium dioxide in diagnosis has been subjected to criticism for some time. The report of Jacobson and Rosenbaum⁴ of a case in which the liver was examined five years after injection of the drug demonstrates its probable deleterious effects on the liver. Further confirmation is found in a study by Pohle and Ritchie,⁵ who examined microscopically the livers of dogs killed two years after the injection of Thorotrast. X-ray films taken at intervals during the period of observation showed no appreciable loss of density of the liver and spleen, and histologically there was hydropic degeneration of the liver cells. The findings were less in degree than those noted by other observers in rabbit experiments, but the authors properly considered the use of thorium for visualization of the liver and spleen in human beings to be definitely restricted to those cases in which the ultimate outcome is problematical.

The widespread use of sulfonamide preparations warrants a discussion of the possible toxic effect of such drugs on the liver. Van Winkle and Cutting⁶ in experiments in cats have demonstrated that the acetylation of sulfanilamide takes place fundamentally in the liver and spleen. Sulfapyridine is also acetylated in large part by the liver.

In the hepatectomized rabbit the acetylation of sulfanilamide does not occur. The finding of a direct van den Bergh reaction in certain cases of jaundice following the use of sulfanilamide seems to indicate direct damage to the liver.⁷ Although certain authors like Schmidt⁸ consider that sulfanilamide is not a hepatic poison, continued reports by most observers⁹⁻¹⁵ seem to produce incontrovertible evidence that the use of this drug can at times cause serious and even fatal liver disease. The unfortunate failure to consider seriously the dangers inherent in the prolonged and uncontrolled administration of sulfanilamide or Neoprontosil is evident in Russell's¹⁶ report of a case of acute toxic necrosis of the liver in which fatal liver damage occurred during prolonged treatment of a gonorrheal infection. Inasmuch as gonorrhea rarely if ever produces important hepatic changes, the unfortunate results obtained in this case may probably be laid to chemotherapy. It is obvious from these and similar reports that a continued recognition of the dangers inherent in the administration of sulfonamide compounds is warranted. Of this group, sulfanilamide to date seems to be the most dangerous in potential damage to the liver.

The occurrence of jaundice during antisyphilitic treatment constitutes a well-known complication of the modern therapy of this disease, although a real doubt still exists in the minds of many physicians concerning the hepatotoxic effects of the arsenicals. An excellent critical review of this subject is presented by Rankin and Marlow,¹⁷ who studied in great detail a series of 62 patients, in all of whom jaundice developed during the course of antisyphilitic treatment with arsenic. The authors conclude that subclinical residual liver damage appears to be present after recovery from postarsphenamine jaundice. In itself postarsphenamine hepatitis is not indicative of a poor prognosis. Alcoholic addiction or the continuation of arsenical therapy in the presence of otherwise static liver damage secondary to the use of the drug is probably hazardous. In certain cases, even after the disappearance of jaundice, it is of interest that the authors demonstrated an increased bilirubin retention and an apparent increase in the size of the liver in association with further arsenical treatment. The statement that patients recovering from "arsenical jaundice" should not use alcohol is confirmed by many examples in my experience and is a point that has not been sufficiently recognized. The article is critically written and is well worth reading. Further proof that postarsphenamine jaundice is an important entity is to be found in an article by Hanger and

Gutman.¹⁸ In most of the 92 patients studied the jaundice appeared to be of the hepatogenous type, as indicated by such laboratory studies as the determination of serum phosphatase, cephalin flocculation and cholesterol esters. The unusual findings indicative of an obstructive type of jaundice with a high phosphatase, normal flocculation and a normal hippuric acid excretion were observed in 12 cases. Proof of the obstructive nature of the disturbance in 4 patients was obtained by punch biopsies of the liver; the lesion in each consisted of inflammatory changes in the finer biliary radicals and bile thrombi in the terminal ducts, without marked changes in the liver parenchyma. Recovery occurred in these 12 patients, but there can be little doubt that these studies indicate a hitherto unsuspected type of hepatic damage caused by arsenic. Further evidence of the occasional dangers of antisyphilitic therapy can be found in the report by Wolman¹⁹ of 2 cases of acute hepatic necrosis in infants following the use of sodium bismuth thioglycollate. The author rightly condemns indiscriminate antisyphilitic treatment of infants born of syphilitic mothers. In each of the above fatal cases such treatment was carried out before signs of congenital disease had become evident.

The direct toxic effect of alcohol on the liver in the absence of other conditioning factors remains a controversial question. In my mind there is little doubt that clinically alcohol causes a serious disturbance of liver function and in all probability organic damage to the hepatic parenchyma in the presence of already existing disease of infectious or toxic origin. In the absence of pre-existing liver disease, there is still doubt of the exact effect of alcohol on the hepatic cell. For this reason an article by Newman et al.²⁰ is of distinct interest. These authors compare the effects of various glycols with that of ethyl alcohol, and show that the latter was metabolized directly by the liver and exerted a depressing effect on its functional activity as indicated by a decrease in oxygen consumption, an increase in blood lactic acid and a decrease in liver glycogen of as much as 45 per cent. Incidentally, it appeared that propylene glycol was the least injurious and objectionable of several glycols used as solvents. It is of interest to note that the addition of insulin to propylene glycol appeared definitely to decrease the oxygen consumption in the liver, and probably to diminish optimal hepatic activity. Connor's²¹ pathological study of so-called "alcoholic cirrhosis" should be mentioned. He reviews in detail studies of livers obtained from 47 chronic alcoholic patients, and presents a clear macroscopic and microscopic picture of the two important

phases of alcoholic cirrhosis: that associated with marked fatty enlargement of the organ with hyaline degeneration and atrophy of the peripheral cells associated with early fibrosis, and the later stage characterized particularly by proliferation of connective tissue and the typical picture of portal cirrhosis. Regardless of the fact that other factors, such as deficiency in specific food substances, undoubtedly condition the production of hepatic changes noted in chronic alcoholic patients, the importance of the effect of alcohol on the liver under certain conditions cannot reasonably be underestimated.

Cinchophen continues to contribute cases of fatal liver injury in spite of the fairly voluminous literature regarding its dangers. The cases reported by MacBryde²² constitute a warning that is still timely.

The use in industry of various solvents continues to add to the knowledge of poisons that may cause severe liver injury. A case of subacute yellow atrophy following exposure to a petroleum distillate known as "Stoddard's solvent," similar to benzene, is presented by Braunstein.²³ The case is important because of the infrequency with which petroleum products appear as causes of liver disorders. A potential hazard may also be mentioned, namely, that suggested by a recent editorial²⁴ on dangers associated with the operation of submarines. Arsine or arseniuretted hydrogen has long been known as a means of producing experimental liver injury. This gas is highly toxic in animals and in human beings, and may under certain conditions be present in submarines.

A fairly common cause of liver damage frequently escapes consideration from this particular angle, namely, the hepatic damage following severe burns. Serious burns are usually and properly considered in relation to the associated loss of fluids, electrolytes and plasma proteins. Structural changes may occur in the liver following burns, as noted in the report by Belt,²⁵ who compares the lesions to those observed in virus diseases such as yellow fever. There was widespread midzonal necrosis. The degree of cytoplasmic degeneration noted would amply explain the various changes, found by Wolff and his collaborators,²⁶ on bilirubinemia, bromsulfalein retention, hippuric acid formation, plasmaphrothrombin changes and dextrose-tolerance modifications seen in 3 patients. Whether these hepatic changes are due to a toxin derived from the burned area, anoxia associated with local capillary stasis, or infection cannot be stated; but it is obvious that the usual measures for treating acute liver insufficiency are indicated once the loss of plasma

protein and electrolytes has been adjusted. Such measures are of even greater importance when one considers that the restoration of plasma-protein deficits is extremely inadequate in the presence of liver failure.

To those readers interested in experimental production of liver damage by unusual agents, the reports on animal experiments on the use of such widely unrelated substances as the seeds of yellow burweed,²⁷ wheat from seleniferous soil,²⁸ dibenzanthracene²⁹ and butter-yellow³⁰ (*p*-dimethylaminoazobenzene) may be recommended. Of particular significance is the finding that the striking cirrhotic changes produced in rats by the use of butter-yellow were entirely reversible on withdrawal of the poison, even after the material had been administered for as long as eight months. Such restoration of hepatic parenchymatous changes to normal after prolonged intoxication provides adequate evidence of the importance of maintaining an optimistic attitude even in the treatment of chronic liver disease.

The importance of dietary measures in the treatment of liver disease is fairly well recognized, but such measures are not yet universally practiced. Experimental and clinical observations have long shown that an adequate supply of easily utilizable carbohydrates is essential for the protection of the liver against various toxins and probably for a restoration of normal hepatic function in the face of existing liver injury. Soskin and Hyman³¹ summarize the rationale of intensive dextrose therapy in diseases of the liver, particularly after damage has occurred from various toxic agents. The mechanism by which benefit is derived from intensive glucose therapy is still not thoroughly understood, but the fact that many toxic substances are excreted as glucuronates suggests that excessive stores of carbohydrates favor detoxification. An important point made by these authors is that the routine use of insulin in connection with dextrose therapy should be avoided unless the patient also has diabetes. In view of recent articles favoring the use of insulin in association with the treatment of acute hepatic damage, it is important to consider that this drug may defeat the very purpose for which dextrose is administered. The suggestion that insulin is contraindicated under such circumstances is also found in the article already referred to by Newman and his collaborators,²⁰ who show that the addition of insulin to propylene glycol inhibits normal hepatic-cell function, and by the even more important studies of Stadie, Lukens, and Zapp³² on the effect of insulin on liver metabolism. The recent studies of Miller and Whipple,³³ Ravdin^{34, 35} and others indicate clearly that an adequate protein intake is important for

proper regeneration following liver injury and for protection against potential liver toxins. That an adequate supply of carbohydrates is also essential and in some cases is of even greater importance is suggested by the studies of Bollman, Butt and Snell.³⁶ These authors caused extensive hepatic damage in rats by the use of carbon tetrachloride. The extensive hepatic necrosis appeared greatest in animals on a low-protein diet and least in those on a high-carbohydrate diet, whereas *regenerative* changes were more marked in animals on a high-protein intake. No correlation could be demonstrated between the amount of hepatic necrosis and the amount of prothrombin in the blood, but it is important to note that animals on high-carbohydrate diets survived without hemorrhage about half again as long as animals on either high-protein or high-fat diets.

The importance of an adequate protein intake in protecting the liver against damage has been well demonstrated by Ravdin and his collaborators.^{34, 35} These investigators showed that the damage from chloroform is independent of the glycogen content of the liver cells, increases progressively with an increase in concentration of hepatic lipids and is minimal when chloroform anesthesia has been preceded by a high-protein diet. They also showed that in the presence of experimental common-duct obstruction a diet high in protein and carbohydrate and containing no fat was found most effective in reducing the fatty-acid concentration of the liver and in increasing hepatic glycogen. This diet gave approximately the same result as the usual high-carbohydrate diet but in half the time. Miller and Whipple³³ likewise showed that protein depletion followed by chloroform anesthesia produced serious hepatic damage, whereas four to five times as much of the anesthetic could be tolerated with but little liver injury in the absence of protein deficiency. Mesinger and Hawkins³⁷ demonstrated that dogs were protected from hepatic damage by arsphenamine if fed an adequate protein diet. They stated that repair occurred more promptly on such a diet than on any other regime. A high-carbohydrate diet was not so uniformly protective. They also stressed the important fact that in animals protected from the toxic effects of arsphenamine by a high-protein or high-carbohydrate diet there was a progressive increase in the icteric index when the diet was changed to one high in fat, even though no additional arsphenamine was added. When fat-fed dogs, showing severe intoxication, were changed to high-protein or high-carbohydrate diets, they immediately recovered from the intoxicated state, and the icteric index decreased. These observations are entirely in keeping with my experi-

ences in the treatment of arsphenamine jaundice and other forms of acute or subacute liver injury. For practical purposes, however, the use of high-protein diets offers real difficulties when applied to patients with serious acute hepatic insufficiency. These patients are frequently incapable of eating anything but the simplest foods, and are often incapable of receiving an adequate intake by mouth. Under such circumstances, in the presence of existing serious liver damage, the immediate therapeutic indication is for adequate intravenous glucose therapy, supplemented by whole-blood or plasma transfusions. When it becomes possible to administer specific proteins intravenously, a very important contribution will have been made to our therapeutic armamentarium. On the other hand, in cases in which potential liver damage is present, such as in the course of antisyphilitic treatment, or in cases in which liver damage is of only moderate degree, there can be little doubt that the emphasis placed by Whipple, Ravdin and others on the importance of an adequate protein intake is of the utmost consequence from the point of view of probable protection against further damage, regeneration of hepatic cells, possibly more adequate gluconeogenesis and a better maintenance of plasma-protein relations. At the present time, liver and milk (casein) seem to be the most valuable forms of protein that are available.

When damage to liver cells has been checked and recovery is well under way, provided the original cause of hepatic disturbance has been removed, it is highly probable that the addition of fat to the diet in reasonable amounts is indicated. This is suggested by the observations of Machella, Higgins and Mann,³⁸ who showed that in partially hepatectomized animals the apparently greater degree of hepatic restoration under forced feeding was to a certain extent due to an accumulation of fat in the hepatic cells. Crandall, Ivy and Ehni³⁹ also suggested, as a result of their studies on hepatic acetone-body production during fasting and fat feeding, that ketogenesis may be a mechanism for supplying the tissues with substances that can be used to replace partially the role of glucose in conserving carbohydrate reserve and decreasing the need for gluconeogenesis. In other words, for protection against liver damage a diet high in protein and carbohydrate and extremely low or lacking in fat is indicated. For aiding the liver in recovery from existing damage a diet that is very high in carbohydrate and as high as possible in protein should be chosen. Once the original cause of the trouble has been removed and recovery is fully under way, a high-calorie diet including reasonable amounts of fat may

provide optimal conditions for maximum recovery.

Further convincing evidence of the importance of an adequate diet as a protection against liver damage has been presented by various investigators. György and Goldblatt⁴⁰ report the occurrence of widespread hepatic necrosis in rats kept on a diet lacking in vitamin B₂ or some other part of the B complex contained in yeast, and vonGlahn and Flinn⁴¹ found definite evidence of protection against arsenical liver injury by the addition of brewer's yeast to the diet. The latter noted that the amount of hepatic glycogen bore no relation to the degree of liver damage produced by arsenic, a finding also noted in Ravdin's experiments. Rich and Hamilton⁴² observed the development of cirrhosis of the liver in all of 14 rabbits kept on diets supplemented by various vitamins but lacking yeast. It is of interest that ascites occurred in 7 of the animals and also that microscopic, formed gallstones were found in intrahepatic bile ducts in several. These authors conclude that the lack of some factor exclusive of vitamins B₁, B₂, and B₆ and nicotinic acid, but contained in yeast, was responsible for the development of the hepatic lesions. The findings of Lauber and Bersin⁴³ contributed similar information concerning the protection afforded the liver by certain specific vitamins. During ether anesthesia the content of liver glycogen in the rabbit was noted to fall to 50 per cent of the preanesthetic level. When vitamin B₁ was administered several days previous to anesthesia, there was only a 10 to 15 per cent reduction in hepatic glycogen; and similarly, when vitamin A or vitamin D in adequate doses was administered for three days prior to ether narcosis, there was only a 15 to 20 per cent glycogen loss. The administration of vitamins B₂ and C did not influence the loss of glycogen from the liver cells.

Vitamin A deficiency has been noted by various observers in the presence of chronic liver disease, and obviously substitution therapy in replacing vitamin A lack in patients with cirrhosis and other chronic forms of hepatic disorders is indicated. Under these circumstances the administration of vitamin A is primarily aimed at correcting the symptoms of a specific vitamin insufficiency rather than protecting the liver from damage. Such a vitamin A lack may be due either to faulty absorption because of the relative lack of bile acids entering the small intestine or to an inadequate dietary intake, and is entirely comparable to similar deficiencies in other fat-soluble vitamins commonly observed in the course of hepatic disturbances. It is possible that a similar lack of vitamin D absorption in the presence of an inadequate intake or delivery of bile salts into the duodenum

may underlie the occasional incidence of pronounced osteoporosis and calcium deficiency observed in chronically jaundiced persons.^{44, 45} Under such circumstances it is obvious that the intensive use of bile acids in addition to an adequate intake of vitamin D and calcium is essential to correct the underlying osseous disturbance.

The obvious importance of a proper understanding of the relation between deficiency in another fat-soluble vitamin, vitamin K, and hepatic function is clearly shown in the numerous articles that have appeared on this subject in the last five years. Although vitamin K lack may occur in any condition in which profound nutritional disease exists, its particular interest lies in its effect on prothrombin deficiency and the tendency to spontaneous bleeding commonly observed in patients suffering from serious disease of the liver. Although in most cases such a condition can be corrected by the administration of adequate amounts of vitamin K, it is of the utmost consequence to remember that serious intrahepatic disease itself may interfere with adequate utilization of this vitamin and the subsequent restoration of prothrombin to normal. An inadequate response to vitamin K therapy in itself indicates liver damage of the most serious degree, and in the occasional case when the administration of vitamin K is ineffective it should be remembered that multiple frequent transfusions may still temporarily control an otherwise fatal bleeding tendency. The role of the liver in the utilization of vitamin K is borne out by numerous articles, experimental and clinical.⁴⁶⁻⁴⁹ That there may be a variable response to vitamin K therapy in a given person is suggested by the report of Ferguson and Calder.⁵⁰ These authors noted that in a patient suffering from a complete biliary fistula of four years' duration, in spite of the administration of constantly increasing amounts of a vitamin K preparation and bile salts by mouth, there were marked variations in the plasma prothrombin, the Ivy bleeding time and the serum-volume index. Although there was a marked initial rise in prothrombin following five days of intensive therapy, thereafter there was an abrupt fall in spite of intensive treatment. Normal figures were not obtained until surgical anastomosis had been performed between the common duct and the duodenum. Postoperative bleeding probably was avoided by the use of multiple transfusions immediately before and after surgical intervention. In this and similar cases of prolonged biliary fistula it is quite probable that disturbances in blood coagulation are due not only to a lack of absorption of vitamin K but also to the loss of valuable constituents on

the drainage bile. It is also possible that in this type of case the parenteral use of synthetic vitamin K (2-methyl-1,4-naphthoquinone) is the only desirable method of administration. For practical purposes it is highly probable that correction of hypoprothrombinemia will in the future be obtained most satisfactorily by such parenteral medication.⁵¹⁻⁵³ Finally, it is important to point out that as a precautionary measure the administration of vitamin K may be a proper preoperative procedure in any form of biliary-tract surgery in which prolonged vomiting or other cause of malnutrition has been present, even if there is no existing demonstrable disease of the liver or diversion of bile from the intestinal tract.

Attempts to affect choleresis by dietary measures or by the use of bile-salt preparations continue to attract attention. The oral administration of oleic acid was noted to stimulate the flow of bile, and the combination of bile salts and oleic acid produced a choleric effect beyond the additive effects of each of these stimulative agents.⁵⁴ The administration of olive oil, however, produced no such effect. A series of careful investigations on choleresis and the composition of bile has been carried out by Berman, Ivy and their collaborators⁵⁵⁻⁵⁸ on bile fistulas in dogs. Bile salts containing no cholesterol, when administered orally or intravenously, increase the cholesterol content of the bile. Further experiments were carried out using three types of bile-acid preparations: unoxidized, conjugated bile acids, as represented by the salts of glycholic and taurocholic acids found naturally in ox bile (Bilron, Fel Bovis); oxidized, conjugated bile acids, as represented by Dech-acid; and oxidized, unconjugated bile acids, as represented by Ketochol and Kebilac, which contain a mixture of mono-, di- and tri-ketocholanic acids, chiefly the last, and by Decholin, which is practically pure tri-ketocholanic acid or dehydrocholic acid. The conclusions drawn by these investigators are convincing and important. They believe that, if one desires to flush the bile ducts with "thin" bile, the use of one of the oxidized, unconjugated preparations of dehydrocholic acid or ketocholanic acid is indicated. If it is desired to increase the output of the bile of the liver and at the same time to increase its concentration in those bile salts naturally predominating in human bile, the use of a preparation of "natural" bile salts is to be advocated. The authors point out the very important fact that the presence of bile pigment in the feces does not necessarily indicate that bile salts are being excreted in the bile. The liver may excrete pigment when it does not form and excrete bile salts. Bile salts

can be used with the hope of counteracting a tendency toward stasis, but, to obtain a maximum effect, the patient must have a liver that will excrete bile salts. The authors are skeptical of the value of bile salt therapy in the presence of hepatitis or during recovery from obstruction, except for the purpose of improving intestinal absorption. Of some additional interest is their finding that intensive bile salt therapy over long periods produces no evidence of liver or kidney damage. It is known that this treatment increases the secretion pressure of bile, and therefore the intraductal pressure. Best, Hicken and Finlayson⁶⁹ make the important point that the continued use of bile salts results in a sharp rise in intraductal pressure, followed not infrequently by a drop to a level rather close to normal. If, therefore, the administration of bile salts is to be considered as a therapeutic measure to effect the expulsion of calculi from the common duct, optimum changes in intraductal pressure can be obtained only by the intensive use of bile salt preparations over short periods.

The etiology of infectious jaundice (so called "catarrhal jaundice") is still undetermined. Increasing evidence is appearing that in all probability this common condition is due to a filterable virus. Findlay's observations⁶⁰⁻⁶¹ in this regard are extremely interesting. This author remarks that on more than one occasion laboratory workers have contracted the disease when working with the serums of infected persons. During the course of yellow fever immunizations over a period of two years, 96 cases of jaundice occurred two to three months after inoculation, and in a fatal case subacute necrosis of the liver was found. Convincing proof was obtained that the jaundice was not due to the virus of yellow fever. The first proof that postinoculation jaundice could give rise to infectious jaundice was obtained following the use of pooled convalescent measles serum. In one institution 7 children became jaundiced ten to twelve weeks after inoculation, and 3 died of acute liver necrosis. Two months later 2 contacts who had not been inoculated developed infectious hepatitis. In 1937 McNulty⁶² reported that about 100 persons had developed infectious jaundice from this batch of pooled serum. Other similar experiences have been reported. Observation seems to indicate that the disease is spread by a droplet infection and has an incubation period of one month or more and an infectious period of one to ten days through the preicteric stage and three to five days in addition after the appearance of jaundice. In Denmark it has been suggested that it is identical with porcine hepatitis and may have been reproduced in human beings by the ingestion of in-

fected pork. In this respect the report by Andersen and Tulinus⁶³ is of interest. In one case, porcine hepatitis was induced by feeding a pig with duodenal juice obtained from a patient with acute epidemic jaundice. A second animal was similarly infected by feeding the liver from a pig with acute jaundice. Examination of the livers in the two infected animals showed that the lesions were identical. Somewhat different conclusions concerning the mode of spread of infection are contained in an article by Norton,⁶⁴ who reports 23 cases occurring in a rather isolated mining community. The sanitation of the community was unsatisfactory; the only milk supply was from an unclean dairy selling raw milk. It was believed that the infection was spread by intimate contact, and possibly through the food or water supply. Satisfactory control was obtained by the application of measures similar to those used in the control of typhoid fever. The average incubation time was apparently thirty-one days. Weil's disease was excluded by appropriate laboratory tests. That such a virus infection could be spread either by droplet infection or by contamination of food is not unlikely, inasmuch as it has been shown that the virus of poliomyelitis can occasionally be demonstrated in the feces of infected persons as well as in nasopharyngeal secretions. The prophylactic measures necessary in this widespread condition are, therefore, obvious. That infectious jaundice may result in serious or even fatal liver injury is fairly well recognized, but the report of Kirshbaum and Popper⁶⁵ on 15 fatal cases points to the necessity of intensive and adequate treatment of liver insufficiency in this disease. In these cases death occurred before the actual development of atrophy of the liver. Of incidental interest is the important, but not generally recognized, clinical fact pointed out by Weir,⁶⁶ who reports 10 cases of atrophy and necrosis of the liver without jaundice.

Exact information of the cause of one type of biliary tract disease, gallstones, is still lacking. There can be little doubt, however, that certain generally suspected factors play an important role in their formation. Carter and his collaborators⁶⁷⁻⁶⁸ on the basis of careful observation of clinical material point out definitely the important role of biliary stasis as a factor predisposing to the formation of gallstones. They consider that the cholesterol content of the gall bladder is not related to the cholesterol content of the blood, and that the bile salt to cholesterol ratio of the bile varies greatly in all types of pathologic change in the gall bladder. They believe that stasis is of great importance in the formation of gallstones, but point out that other unknown factors must

be operative, inasmuch as the vast majority of the noncalculous gall bladders also showed evidence of stasis. These authors also comment on the finding that in many cases gallstone formation occurred without any associated evidence of infection or inflammation of the gall bladder. Riegel, Calder and Ravdin⁶⁹ produce similar evidence that no relation can be shown between the concentration of cholesterol in the blood and the concentration of cholesterol in gall-bladder bile. That the concentration of bile acid may not be the only factor in holding cholesterol in solution in the bile, thereby preventing the formation of cholesterol calculi, is suggested by the studies of Dolkart and his associates,⁷⁰ who add further evidence to previous observations that fatty acids in the bile are probably an important factor in holding cholesterol in solution. Further evidence concerning the factor of biliary stasis, due, for example, to temporary obstruction of the common duct such as may occur from intermittent spasm of the sphincter of Oddi or from reversed peristalsis in the duodenum, is presented in experiments of Bisgard and Baker,⁷¹ who produced bile-pigment stones in goats as an indirect result of operative procedures on the common duct. A somewhat similar finding was observed by Aronson⁷² in dog experiments. The latter observer noted that such concretions obtained experimentally consisted of calcium, cholesterol, bile pigment and a large amount of unidentified black material. In an analysis of a large number of mixed human gallstones he⁷³ identified a similar dark-black residue, which contained practically no inorganic material. He believed that it probably consisted of pyrrole derivatives, degradation products of the bile pigments. Such a finding is of much interest inasmuch as material entirely similar in appearance to that described by Aronson is commonly seen in specimens of bile obtained by duodenal drainage from patients with gallstones. A rather curious and interesting finding is that of Ivy and Goldman,⁷⁴ who showed by experiments that constipation, irritation of the colon or stimulation of various divisions of the splanchnic nerves may predispose to stasis of the biliary tract by decreasing bile formation and by increasing the resistance to the flow of bile through the sphincter of Oddi into the duodenum.

It is obvious from these observations and those of Rich and Hamilton⁴² already alluded to, in which microscopic gallstones were observed in the finer biliary radicals as a result of vitamin B deficiency, that numerous factors enter into the causation of biliary calculi. To some extent, at any rate, prevention may be attempted by measures directed toward a diet adequate in all constituents, careful

bowel hygiene and the avoidance of colonic irritation by excessive catharsis or pronounced constipation, the feeding of simple fats in all meals to bring about frequent, adequate emptying of the gall-bladder contents, and the intensive and rapid treatment of any infectious or toxic process involving the biliary tract that might alter the chemical constituents of the bile because of functional hepatic disturbances.

Any adequate consideration of surgery of the gall bladder is beyond the scope of this review. Certain impressions from clinical experience and from examination of the current literature may be mentioned. The successful treatment of acute cholecystitis, a condition that is nearly always due to obstruction of the outlet of the gall bladder by calculus, still represents a controversial problem. Although some surgeons, such as Glenn,⁷⁵ consider that acute cholecystitis, like acute appendicitis, requires operation as soon as the diagnosis is made, a large number of experienced operators continue to advise a more conservative management of this condition. Graham,⁷⁶ Fallis and McClure,⁷⁷ Berk,⁷⁸ Elkin⁷⁹ and others favor a postponement of surgical measures until sufficient time has elapsed to permit a restoration of fluid balance and the institution of measures designed to protect the liver against the damage incident to anesthesia, medication and the depletion associated with this condition. It is undoubtedly true that the growing awareness of the need of such optimal preoperative preparation constitutes one of the most important contributions to modern surgery. For the most part, there is general agreement that immediate surgery is indicated only when there is evidence of a rapid spread of infection, with signs of empyema or perforation of the gall bladder. A welcome note of surgical conservatism is found in the article by O'Donnell⁸⁰ on the rationale of cholecystectomy in the noncalculous gall bladder. He reports that a careful investigation of the results in approximately 7000 patients with chronic cholecystitis who were subjected to cholecystectomy shows that over a third are complete failures. He rightly suggests that the recurrence of symptoms in cholecystectomized persons, particularly when gallstones are not present at operation, warrants the inference that an incorrect preoperative diagnosis underlies the therapeutic failure. He, like Graham and others, is skeptical of the role played by the noncalculous gall bladder in the production of symptoms, even when moderate cholecystitis can be shown to exist. There can be little doubt that gall-bladder surgery in such cases provides an example of wishful thinking and that a more adequate study will fre-

quently demonstrate that symptoms are due to simple alterations of gastrointestinal function derived from faulty bowel habits, cathartic habits, peptic ulcer, colitis, hepatitis and urinary-tract disturbances. In this respect the rather ingenious observation of Verbruyck,⁸¹ which indicates an unusual cause of right-upper quadrant distress due to disease at the hepatic flexure, is of interest. A further judicious and rather unusual surgical comment is found in the article by Warren and Balch,⁸² who discuss carcinoma of the gall bladder. There can be little doubt from the evidence provided by various articles that gallstones are present in nearly three quarters of such cases, but these authors draw what seem to be very proper conclusions; namely, that the number of patients with gallstones who develop carcinoma of the gall bladder is extremely small, and that the decision whether to operate in cases of gallstones with few or no symptoms should be governed by a consideration of the nonmalignant complications rather than by the risk of carcinoma of the gall bladder. A growing recognition of the fact that gallstones are not too infrequent in children is evidenced in the report by Seidler and Brakeley,⁸³ who report a case diagnosed by the usual methods. Their review of the literature indicates that at least 450 cases of cholelithiasis are already recorded in children under fifteen years of age.

Of importance in the diagnosis of cholelithiasis are the reports of Layne and Bergh⁶⁴ and Zollinger and Kevorkian.⁸⁵ The former have carried out a most instructive experimental study of pain in the human biliary tract induced by spasm of the sphincter of Oddi. By sudden distention of the common bile duct, pain similar to the biliary colic typical of common duct stone was produced in 29 patients. It is of interest that these subjects experienced deep epigastric or right upper-quadrant pain following such maneuvers, and in 11 cases there was an associated but delayed transmission of the pain to the right subscapular and interscapular area. In each patient, pain was associated with evidence of increased tension within the bile duct, probably secondary to the spasm of the sphincter of Oddi but not associated with any duodenal disturbance. As previously noted by Zollinger,⁸⁶ in somewhat similar experiments, nausea was occasionally observed. The clinical study by Zollinger and Kevorkian showed that in 75 cases of common duct stone slightly more than half the patients complained of right-upper quadrant pain, 40 per cent of the group localized their pain in the epigastrium, 5 per cent had left-upper-quadrant pain, and two thirds of the group also had pain in the subscapular area. Such observa-

tions are obviously important in the diagnostic interpretation of symptoms. The latter article is also of interest in that a careful comparison is made of symptoms associated with common duct stone and those in a large group of patients with carcinoma of the pancreas.

Those interested in evaluating various diagnostic tests directed toward an understanding of the degree or type of hepatic disturbance in cases of actual biliary-tract disease are referred to the appended bibliography, which includes many of the important recent articles. It is also suggested that two excellent articles by Snell⁸⁷ and Stewart⁸⁸ be consulted for additional discussion of physiologic measures designed to protect the liver from damage or to treat adequately symptoms due to existing hepatic insufficiency.

REFERENCES

1. Townsend E. Acute yellow atrophy of liver two cases with one recovery. *Brit M J* 2 558 560 1939
2. Schenck C H and Huggins G M. The effect of partial hepatectomy on the action of certain barbiturates and a phenylurea derivative. *Am J M S* 200 264 268 1940
3. Hall W L, Gibson R B and Weed L A. Studies on the intra-venous injection of colloids. II Effects of gum acacia on certain functions of the liver with a note on its effects on the production of immune bodies. *J Lab & Clin Med* 26 330 339 1940
4. Jacobson L C and Rosenbaum D. Postmortem findings and radio-actively determined survival time after injection of thorotrast. *Radiology* 31 601 607 1938
5. Pöhlke E A and Ruch G. Histologic studies of the liver, spleen and bone marrow in dogs following the intravenous injection of thorium dioxide. *A J Roentgenol* 41 950 953 1939
6. van Winkle W Jr and Cutting W C. Acetylal on of sulfanilamide and sulphydryl in the cat. *J Pharmacol & Exper Therap* 69 40-41 1940
7. Watson C J and Snook W W. Effect of sulfanilamide and sulphydryl on hemoglobin metabolism and hepatic function. *Arch Int Med* 68 825 846 1940
8. Schmidt W. Leberfunktionsprüfungen bei Therapie mit Sulfamid. *Klin Wchnsch* 18 953 956 1939
9. Bannick E G, Brown A E and Foster F P. Therapeutic effect and toxicity of sulfanilamide and several related compounds. Further clinical observations. *J A M A* 111:770 777 1938
10. Garsden C. Acute hepatitis due to sulfanilamide. *J A M A* 111:2283 2285 1938
11. Hageman P O and Blake F A. Specific febrile reaction to sulfanilamide drug fever. *J A M A* 109 642 646 1937
12. Spring M and Bernstein I. The coexistence of toxic hepatitis, acute hemolytic anemia and renal damage following sulfanilamide therapy report of two cases. *Ann Int Med* 14 153 164 1940
13. de Bont A G. Sulfazone epistaxis as dei preparati sulfamidici. *Ateneo* 9 248 251 1940
14. Cline E W. Acute yellow atrophy of liver following sulfanilamide medication. *J A M A* 111 2384 1938
15. Gerdler W. Leberparenchymschädigung nach Verabreichung von Proniosin bei chronisch rezidivierendem Erysipel. *Dermat Wchnsch* 72:729 732 1936
16. Russell H. Acute necrosis of liver following use of sulfanilamide. *Ann Int Med* 14 168 170 1940
17. Rankin T J and Marlow F W. Liver damage after recovery from postarphenamine jaundice follow up study. *Am J Syph Gonorr & Ven Dis* 24 301 321 1940
18. Hanger F M Jr and Gutman A B. Postarphenamine de jaundice apparent by due to obstruction of intrahepatic biliary tract. *J A M A* 115 263 271 1940
19. Wolman I J. Acute necrosis of the liver in infants following sodium butylthioethylcellulose administration. *Am J Syph Gonorr & Ven Dis* 24 330 336 1940
20. Newman H W, Van Winkle W Jr, Kennedy M K and Morton H L. Comparative effects of propylene glycol, other glycols and alcohol on the liver directly. *J Pharmacol & Exper Therap* 68 194 200 1940
21. Connor C L. Fatty infiltration of the liver and the development of cirrhosis in diabetes and chronic alcoholism. *Am J Path* 14:347 364 1936
22. HachBryde C M. Toxic hepatitis and acute yellow atrophy following medication with a methophen-containing cold cure. *J A M A* 114 316 318 1940
23. Braunstein L E. Subacute yellow atrophy of the liver due to alcohol. *J A M A* 114 136 138 1940
24. Ederton L. The human mechanism and the submarine. *J A M A* 116 323 1941
25. Bell T H. Liver necrosis following burns a mutilating type of yellow fever. *J Path & Bact* 48 493-498 1939

26. Wolff, W. A., Elkinton, J. R. and Rhoads, J. E. Liver damage and dextran tolerance in severe burns. *Ann Surg.* 112:158-160, 1940.
27. McCulloch, E. C. The experimental production of hepatic cirrhosis by the seed of *amsinckia intermedia*. *Science* 91:95, 1940.
28. Lillie, R. D. and Smith, M. I. Histogenesis of hepatic cirrhosis in chronic food selenium. *Am J. Path.* 16:223-228, 1940.
29. Goerner, A. and Goerner, M. M. Effect of dibenzanthracene on liver. *Am J. Cancer* 37:518-520, 1939.
30. Orr, J. W. The histology of the rat's liver during the course of carcinogenesis by butter yellow (p dimethylaminobenzene). *J. Path. & Bact.* 50:393-408, 1940.
31. Soskun, S. and Hyman, M. Physiologic basis of intravenous dextrose therapy for diseases of the liver. *Arch. Int. Med.* 64:1265-1270, 1939.
32. Stadie, W. C., Lukens, F. D. W. and Zapp, J. A., Jr. The effect of insulin upon urea formation, carbohydrate synthesis and respiration of liver of normal and diabetic animals. *J. Biol. Chem.* 132:393-409, 1940.
33. Miller, L. L. and Whipple, G. H. Chloroform liver injury increases as protein stores decrease: studies in nitrogen metabolism in these dogs. *Am J. M. Sc.* 129:204-216, 1940.
34. Goldschmidt, S., Vars, H. M. and Ravdin, I. S. The influence of foodstuffs upon the susceptibility of the liver to injury by chloroform, and the probable mechanism of their action. *J. Clin. Investigation* 18:277-289, 1939.
35. Johnson, J., Ravdin, I. S., Vars, H. M. and Zintel, H. A. Symposium on preoperative and postoperative treatment effect of diet on composition of liver in presence of obstruction of common bile duct. *Arch. Surg.* 40:1104-1115, 1940.
36. Bollman, J. L., Butt, H. R. and Snell, A. M. Influence of the liver on utilization of vitamin K. *J. A. M. A.* 115:1087-1091, 1940.
37. Messinger, W. J. and Hawkins, W. B. Arspenamine liver injury modified by diet: protein and carbohydrate protective, but fat injurious. *Am J. M. Sc.* 129:216-225, 1940.
38. Macchelli, T. E., Higgins, G. M. and Mann, F. C. Role of food intake in the restoration of the liver following partial hepatectomy in albino rats. *Am J. Digest. Dis.* 7:152-154, 1940.
39. Crandall, L. A., Jr., Ivy, H. B. and Ehni, G. J. Hepatic acetone body production in the dog during fasting and fat feeding. *Am J. Physiol.* 131:10-17, 1940.
40. Gyorgy, P. and Goldblatt, H. Hepatic injury on nutritional basis in rats. *J. Exper. Med.* 70:185-192, 1939.
41. Von Glinn, W. C. and Flinn, F. B. Effect of yeast on incidence of cirrhosis produced by lead arsenite. *Am J. Path.* 15:771-781, 1939.
42. Rich, A. R. and Hamilton, J. D. The experimental production of cirrhosis of the liver by means of a deficient diet. *Bull. Johns Hopkins Hosp.* 66:185-198, 1940.
43. Lauber, H. J. and Bersin, T. Die Beeinflussung des Glykogengehaltes der Leber durch die Aethernarkose und die Beziehungen zu den fettlöslichen Vitaminen. *Klin. Wchnschr.* 18:715, 1939.
44. Hansen, A. E., Ziegler, M. R. and McQuarrie, I. Disturbance of osseous and lipid metabolism in child with primary carcinoma of liver. *J. Pediatr.* 17:9-30, 1940.
45. Loeper, M., Lemaire, A. and Lesobre, R. Spondylomalacie dans la cirrhose biliaire. *Arch. d. mal. de l'app. digestif* 29:577-587, 1939.
46. Andrus, W. D., Lord, J. W., Jr. and Moore, R. A. Effect of hepatectomy on plasma prothrombin and utilization of vitamin K. *Surgery* 6:899, 1939.
47. Stewart, J. D. and Rourke, G. M. Control of prothrombin deficiency in obstructive jaundice by the use of vitamin K. *J. A. M. A.* 113:2223-2227, 1939.
48. Pohle, F. J. and Stewart, J. K. Observations on the plasma prothrombin and the effects of vitamin K in patients with liver or biliary tract disease. *J. Clin. Investigation* 19:365-372, 1940.
49. Andrus, W. D. and Lord, J. W., Jr. Clinical investigations of some factors causing prothrombin deficiencies: significance of liver in their production and correction. *Arch. Surg.* 41:596-606, 1940.
50. Ferguson, L. K. and Calder, D. G., Jr. Complete biliary fistula of 4 years' duration with hemorrhagic tendency. *Am. J. Digest. Dis.* 6:722-725, 1939.
51. Frank, H. A., Hurwitz, A. and Seligman, A. M. Treatment of hypoprothrombinemia with synthetic vitamin K₂. *New Eng. J. Med.* 221:975-977, 1939.
52. Rhoads, J. C. and Fliegelman, M. T. The use of 2-methyl-1, 4-naphthoquinone (synthetic vitamin K substitute) in treatment of prothrombin deficiency in patients. *J. A. M. A.* 114:400, 1940.
53. Townsend, S. R. and Mills, E. S. Hemorrhagic tendency associated with prothrombin deficiency and its treatment with vitamin K and bile. *Canad. M. A. J.* 42:541-546, 1940.
54. Zuckerman, I. C., Jacobi, M., Kogut, B. and Klein, B. Studies in human biliary physiology: comparative effects of orally administered olive oil, oleic acid and glycerine, with and without bile salts, on quantity of bile secretion. *Am. J. Digest. Dis.* 7:208-210, 1940.
55. Schmidt, C. R., Beazell, J. M. and Berman, A. L. Studies on secretion of bile. *Am. J. Physiol.* 126:120-135, 1939.
56. Ivy, A. C. and Berman, A. L. Rationale of bile salt therapy in biliary tract disease. *Minnesota Med.* 22:815-820, 1939.
57. Berman, A. L., Snapp, E., Ivy, A. C., Atkinson, A. J. The effect of long continued ingestion of oxidized bile acids on the dog and rat. *Am. J. Digest. Dis.* 7:280-284, 1940.
58. Berman, A. L., Snapp, B. S., Ivy, A. C., Atkinson, A. J. and Hough, V. S. The effect of various bile acids on the volume and certain constituents of bile. *Am. J. Digest. Dis.* 7:333-346, 1940.
59. Best, R. R., Hicken, N. F. and Finlayson, A. I. Effect of dehydrocholic acid upon biliary pressure and its clinical application. *Ann. Surg.* 110:67-80, 1939.
60. Editorial. Infective hepatitis and catarrhal jaundice. *Lancet* 1:558, 1940.
61. Findlay, G. M. Infective hepatitis and catarrhal jaundice. *J. Roy. Army M. Corps* 74:72-79, 1940.
62. McNalty, cited in editorial.⁶⁰
63. Andersen, T. T. and Tulinius, S. Experimental chronic hepatitis (cirrhosis) based on infection. *Acta med. Scandinav.* 104:550-560, 1940.
64. Norton, J. A. Acute infectious jaundice. *J. A. M. A.* 113:916, 1939.
65. Kirshbaum, J. D. and Popper, H. Toxic hepatitis: intermediary fatal form with enlargement of liver: a clinical and pathologic study. *Arch. Int. Med.* 65:465-476, 1940.
66. Weir, J. F. Atrophy and necrosis of liver without jaundice. *Ann. Int. Med.* 12:1845-1854, 1939.
67. Carter, R. F., Greene, C. H., Twiss, J. R. and Holz, R. Etiology of stone in common bile duct. *Arch. Surg.* 40:103-119, 1940.
68. Idem. Etiology of gallstones: critical survey of literature and study of applicability of various theories in two hundred and thirty-nine operative cases. *Arch. Surg.* 39:691-710, 1939.
69. Riegel, C., Calder, D. G. and Ravdin, I. S. Changes in cholesterol content of hepatic bile subjected to gall bladder activity. *Am J. Physiol.* 129:271-277, 1940.
70. Dolkart, R. E., Lorenz, M., Jones, K. K. and Brown, C. F. G. Relation of fatty acids and bile salts to the formation of gallstones. *Arch. Int. Med.* 66:1087-1094, 1940.
71. Bisgard, J. D. and Biker, C. P. Studies related to the pathogenesis of cholecystitis, cholelithiasis and acute pancreatitis. *Ann. Surg.* 112:1006-1034, 1940.
72. Aronson, H. G. Factor of bile stasis in experimental production of gallstones in dogs. *Arch. Surg.* 41:960-969, 1940.
73. Idem. A component of gallstones insoluble in ordinary solvents and accounting in part for their dark coloration. *Arch. Path.* 30:670-674, 1940.
74. Ivy, A. C. and Goldman, L. Physiology of the biliary tract. *J. A. M. A.* 113:2413-2417, 1939.
75. Glenn, F. Acute cholecystitis. *Surg., Gynec. & Obst.* 69:431-435, 1939.
76. Graham, R. R. Acute cholecystitis. *Am. J. Surg.* 46:585-592, 1939.
77. Fallis, L. S. and McClure, B. D. Acute cholecystitis: review of three hundred and twenty cases. *Surg., Gynec. & Obst.* 70:1022-1038, 1940.
78. Berk, J. E. Management of acute cholecystitis. *Am. J. Digest. Dis.* 7:325-332, 1940.
79. Elkin, D. C. Cholecystitis: indications for operation. *J. M. A. Georgia* 28:275-278, 1939.
80. O'Donnell, L. D. The rationale of cholecystectomy in noncalculous gallbladders. *Pennsylvania M. J.* 42:1315-1319, 1939.
81. Verbruyck, J. R., Jr. Adhesions of cholecystohepatic flexure: new syndrome with specific test. *J. A. M. A.* 114:314-316, 1940.
82. Warren, R. and Balch, F. G., Jr. Carcinoma of the gall bladder: the etiological role of gallstones. *Surgery* 7:657-666, 1940.
83. Seidler, V. B. and Brakelley, E. Gallstones in children: report of case diagnosed by roentgen examination and confirmed at operation. *J. A. M. A.* 114:2082-2085, 1940.
84. Layne, J. A. and Bergh, G. S. An experimental study of pain in the human biliary tract induced by spasm of the sphincter of Oddi. *Surg., Gynec. & Obst.* 70:18-24, 1940.
85. Zollinger, R. and Kevorkian, A. Y. Surgical aspects of obstructive jaundice. *New Eng. J. Med.* 221:486-488, 1939.
86. Zollinger, R. Significance of pain and vomiting in cholelithiasis. *J. A. M. A.* 105:1647-1652, 1935.
87. Snell, A. M. Recent advances in the treatment of hepatic disease. *Minnesota Med.* 23:551-556, 1940.
88. Stewart, J. D. Clinical and experimental evidence on the nutritional requirements in obstructive jaundice. *New Eng. J. Med.* 223:1059-1066, 1940.

RECENT ARTICLES EVALUATING LIVER FUNCTION TESTS

- Andrus, W. D. and Moore, R. A. Lipid amino nitrogen content of blood in diseases of liver and of biliary tract. *Arch. Surg.* 39:3-9, 1939.
- Binkley, J. S. Aspiration biopsy of tumors of liver: report of nineteen cases. *Am. J. Cancer* 36:193-200, 1939.
- Brown, H. C. and Broom, J. C. Observations on agglutination test for Weil's disease. *Brit. M. J.* 1:1178, 1939.
- DeLor, C. J. and Reinhart, H. L. Analysis of hippuric acid, galactose tolerance, bromsulphalein and prothrombin tests in three hundred and eighty-one cases. *Am. J. Clin. Path.* 10:617-622, 1940.
- Diamond, J. S., Siegel, S. A. and Myerson, S. The biliary pigment curve during the secretion test: its diagnostic significance in the non-functioning gall bladder. *Am. J. Digest. Dis.* 7:133-136, 1940.
- Ferguson, L. K., Calder, D. G., Jr. and Reinhold, J. G. Ivy bleeding time, serum volume index and prothrombin content of blood in estimating bleeding tendency in jaundice. *Surg., Gynec. & Obst.* 71:603-605, 1940.
- Godtfredsen, E. Value of Takata reaction in hepatic diseases. *Nord. med.* 5:131-136, 1940.
- Gray, S. J. The colloidal gold reaction of blood serum in diseases of the liver. *Arch. Int. Med.* 65:523-544, 1940.
- Greene, C. H., Holz, R. and Leahy, E. Clinical value of determination of cholesterol esters of blood in hepatic disease. *Arch. Int. Med.* 65:1130-1143, 1940.
- Gutman, A. B., Olson, K. B., Gutman, E. B. and Flood, C. A. Effect of disease of liver and biliary tract upon the phosphatase activity of serum. *J. Clin. Investigation* 19:129-152, 1940.
- Iversen, P. and Roholm, K. On aspiration biopsy of liver with remarks on its diagnostic significance. *Acta med. Scandinav.* 102:1-16, 1939.
- Jankelson, J. R., Segal, M. S. and Aisner, M. Tyrosinemia and Takata-Ara tests in cirrhosis of the liver. *Rev. Gastroenterol.* 6:341-343, 1939.
- Josephson, B. The elimination of cholic acids in patients with liver disease. *J. Clin. Investigation* 18:343-350, 1939.
- Levy, L. and Meyers, F. Comparison of roentgenography and duodenal drainage in diagnosis of cholelithiasis. *Am. J. Roentgenol.* 44:203-206, 1940.
- McArdle, B. Serum choline esterase in jaundice and diseases of liver. *Quarterly J. Med.* 9:107-119, 1940.

- Macdonald D. Practical and clinical test for liver reserve. *Surg. Gynec. & Obst.* 69: 82, 1939.
- Magath T. B. The Takata-Ara test in liver disease. *J. Lab. & Clin. Med.* 26: 156-173, 1940.
- Mercoli D. and Ferroni M. Il quadro protidico ematico ed assetto nella cirrosi epatica atrofica. *Rassegna di fisiopat. clin. e terap.* 12: 193, 215, 1940.
- Morrison L. M. and Swalm W. A. Studies of liver function in health and disease: observations on simple and accurate method for quantitative determination of bile salts in urine and bile. *J. Lab. & Clin. Med.* 25: 39, 743, 1940.
- Payne W. W. The plasma phosphatase in jaundice in children. *Proc. Roy. Soc. Med.* 32: 1265, 1267, 1939.
- Quick A. J. Intravenous modification of the hippuric acid test for liver function. *Am. J. Digest. Dis.* 6: 716, 1939.
- Rounberg D. H. and Soskin S. The agarubin S test of liver function: an evaluation with a comparative study of the bromsulphthalein and hippuric acid tests. *Ann. Int. Med.* 13: 1644, 1654, 1940.
- Schiffmann A. and Winkelmann L. Influence of liver on serum phosphatase. *Arch. Int. Med.* 63: 919, 929, 1939.
- Sparkman R. Studies of urobilinogen. Simple and rapid method for quantitative determination of urobilinogen in stool and in urine. *Arch. Int. Med.* 63: 858, 866, 1939.
- Watson C. J. Regurgitation on jaundice: clinical differentiation of the common forms with particular reference to the degree of biliary obstruction. *J. A. M. A.* 114: 2427, 2432, 1940.
- White F. W., Deutsch E. and Maddock S. The comparative value of serial hippuric acid excretion, total cholesterol, cholesterol ester and phospholipid tests in diseases of the liver: the results of the tests. *Am. J. Digest. Dis.* 6: 603, 610, 1939.
- Wilson S. J. Quantitative prothrombin and hippuric acid determinations as sensitive reflectors of liver damage in human subjects. *J. Lab. & Clin. Med.* 25: 1139, 1145, 1940.
- Zimanyi I. Acholuric catarrhal jaundice in infancy: report of case. *Arch. Pediat.* 57: 207, 215, 1940.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27121

PRESENTATION OF CASE

A thirty-six-year-old clerk complained of dyspnea and precordial pain.

Two years previously the patient was first troubled with palpitation and pain in the left arm. Cardiac murmurs were heard at the time, and he had been in bed almost continuously since that date. He did not improve and had dyspnea on the slightest exertion, with cough and an occasional hemoptysis. Some months before observation, he began to suffer from attacks of left precordial pain, which radiated down the left arm and through to the shoulder blades. The pain lasted for about fifteen minutes, occurred at rest, often awakened him at night, and was at first viselike, finally dwindling to a sense of oppression. Nitroglycerin gave almost immediate relief. The patient had been given aminophyllin for the last four months, which altered the pain to mere precordial oppression. Three weeks prior to observation he caught a cold, and since that time his cough and dyspnea had increased and were accompanied by a feeling of abdominal fullness and nausea with the development of ankle edema. No definite history of rheumatic fever could be elicited. One sister was known to have rheumatic heart disease.

On examination the patient was poorly developed and poorly nourished, dyspneic on the slightest exertion or talking. The neck veins were engorged. The heart was enlarged, the left border of dullness being in the fifth interspace 2 cm. beyond the mid-clavicular line. A systolic murmur could be heard in the aortic area and was transmitted to the neck; there was an associated systolic thrill. Along the left sternal border there was a loud early diastolic murmur, and at the apex a faint systolic and a very loud rumbling presystolic murmur. The pulse was 90 and irregular, the blood pressure 125 systolic, 70 diastolic. A few rales were present at the lung bases. The abdomen was distended and the liver edge palpable two fingerbreadths below the costal margin. There was no definite edema, but slight clubbing of the fingers was noted.

An electrocardiogram showed a normal rhythm at a rate of 90. There was early inversion of the T waves in Leads 1 and 2 and slight inversion of the T waves in Lead 3. There was no abnor-

mal axis deviation. The PR interval equaled 0.17 second, and the duration of the QRS complexes was 0.09 second.

The patient remained at home under the care of his physician and was given digitalis and aminophyllin, and, when necessary, nitroglycerin for pain; salyrgan on two occasions produced a good diuresis. Ten days after observation a pain of unusual severity developed in the lower back and was accompanied by marked dyspnea and cough. Morphine was ineffective, but nitroglycerin every half hour through the night gave appreciable relief. The next morning the patient ate breakfast at the table, and later his physician returned and administered salyrgan, but there was no response. Back pain and dyspnea were still present, and in the afternoon nausea developed coincident with a bowel movement; a few hours later he began to cough up blood. It was necessary for him to sit in a chair to get his breath, cough and hemoptysis persisted, and as the day wore on, the pain became so severe that he cried out in agony. It eased for a few hours, but returned in the evening, and the patient clutched his chest, obviously striving to suppress the cries that formed on his lips. Death occurred within an hour.

DIFFERENTIAL DIAGNOSIS

DR. HOWARD B. SPRAGUE: Apparently this is a case in which the patient was taken care of at home until he died, and the doctor was, I hope, puzzled about why he died, and secured an autopsy. I am equally puzzled. The patient gave no past history of rheumatic infection, heart disease or venereal disease. He had a short history of what was apparently cardiac failure, a total history of two years. He complained first of palpitation and pain of an anginal nature, dyspnea, which was severe, and hemoptysis. The pain radiated down the left arm and was relieved by nitroglycerin. It was relieved also by a drug of the xanthine series, which presumably acted as a coronary dilator.

The immediate present illness started in association with a respiratory infection, the cough and dyspnea increased, and the patient developed a little ankle edema. Examination showed an increase in venous pressure, a heart enlarged to the left, and a systolic murmur at the aortic area with a thrill, and a loud diastolic murmur along the left sternal border; it is stated that there was a very loud rumbling presystolic murmur at the apex and only a slight systolic. The rhythm of the heart, although it is described as irregular, at first appears to have been fundamentally normal from the electrocardiogram — presumably an irregularity due to premature beats. The patient had no edema at the time of this examination. He

had a slight amount of clubbing of the fingers and a blood pressure that was not very striking in view of the description of the loud early diastolic murmur along the left sternal border, that is, the diastolic pressure was not markedly decreased. Many things that would make me more comfortable in diagnosing this type of cardiac lesion are missing from this record. The patient did not have all the investigation he might have had if he had been in the hospital, so that we have to interpolate. What, for example, was the quality of the first and second heart sounds? Was there a sharp first sound with an apical diastolic murmur? Was there a diminution or absence of the aortic second sound? Was there an accentuation of the pulmonary second sound? Was there any cyanosis?

DR TRACY B. MALLORY: Dr. McGinn can answer some of these questions.

DR SYLVESTER MCGINN: The sounds themselves were not striking. The aortic second sound was almost wiped out by an early blowing diastolic murmur. At the apex, there was a faint systolic, but primarily a presystolic rumble. P_2 was greater than A_2 . The patient was not cyanotic. He had had a Hinton test in a period of hospitalization two years prior to this admission. It was negative.

DR SPRAGUE: I judge that there was a diminution of the aortic second sound, but the murmur was essentially a two-way rough murmur with a systolic thrill. There was no x-ray examination of the heart and aorta, so far as we know. The only piece of laboratory evidence in the record is the electrocardiogram. It is a popular idea that this is the only piece of information that a cardiologist must have to make a complete diagnosis of cardiac lesion, as Sherlock Holmes could tell the way a man looked by discovering the kind of cigar ashes he left around, but I assure you it is not so with the cardiologist. What do we get out of the electrocardiogram? The tracings showed that the T waves were downwardly directed in all three Leads, and the record refers to an early inversion in Leads 1 and 2. It is not possible to see these tracings. I suppose that the electrocardiogram was taken after the patient had digitalis. The T wave changes could be consistent with digitalis effect in the electrocardiogram, and the fact that it was noted as an early inversion indicates to me a sagging of the ST segment and not a late inversion of the coronary type.

DR MALLORY: Digitalis had been administered before the electrocardiogram, but the amount is not specified.

DR SPRAGUE: Concerning the absence of any abnormal electrical deviation, if we were to assume that this was an aortic lesion, and what was heard at the apex was an Austin-Flint murmur, the picture would be one of left ventricular strain, and I should expect left axis deviation. If, however, the patient had aortic and mitral lesions on a rheumatic basis, the strain on the two sides of the heart might well balance, so that there would be no disturbance in the electrical axis. The possible etiologic agents that come to mind are of course rheumatic fever and syphilis. There was no history of venereal disease, and the blood Hinton reaction was negative, there was no history of rheumatism. It does not seem as though we had to consider an arteriosclerotic, hypertensive lesion at this age, with no evidence of hypertension. I take it that no fever was connected with this episode, and it does not seem as if we have to consider bacterial endocarditis. The factors in favor of a rheumatic heart are the patient's age, and the fact that he had hemoptysis as a presenting sign. He presumably had a mitral lesion from the description of the heart murmurs. In favor of the syphilis are the fact that he came to grief quite suddenly at the age of thirty-four, with no story of previous cardiac disease, the fact that there was pain of an anginal nature as such an outstanding symptom, the obvious aortic valve disease, the description of the left ventricular enlargement without much emphasis on mitral shape to the heart, and the failure with normal cardiac rhythm. If he had only had auricular fibrillation, we could then have said right away that this was a rheumatic heart. The question of hemoptysis is perhaps an important factor here. The hemoptysis goes back two years. It is true that aneurysm of the aorta may cause hemoptysis of a small amount for weeks or even months before a final rupture, but it is much more likely that rheumatic heart disease would be the background. The last issue of the *American Heart Journal* has an analysis of fifty cases of hemoptysis in rheumatic heart disease by Wolff and Levine,* and I was interested to see in their figures that almost half of these patients (and they died within a relatively short time) had normal cardiac rhythm rather than auricular fibrillation. Wolff and Levine found that active rheumatism, pulmonary infarction and high degrees of pulmonary arteriosclerosis were the common mechanisms of hemoptysis in this rheumatic group, and pulmonary infarct was the commonest cause if congestive failure was present at the time. The average age at the onset of hemoptysis was approximately thirty-three years.

*Wolff L. and Levine H. B. Hemoptysis in rheumatic heart disease. *Am Heart J* 21: 163-171, 1941.

Then there is this terminal episode, which I may have to ask more questions about. It consists in severe pain in the lower back. Where is the lower back?

DR. MCGINN: I cannot help on that. I saw him on only one occasion. This is a history from the family.

DR. SPRAGUE: The patient had marked dyspnea and cough, which were apparently relieved by nitroglycerin. He had a condition that at least allowed him to get up and go to his breakfast the next morning. The pain and the dyspnea apparently continued, and then he started to cough up blood. The pain, I judge from the story, remained severe in his back, although we are told that he clutched his chest. Whether or not he had two pains from the same cause, I do not know. He lived for only twenty-four hours after the onset of the pain. Was this an attack of angina pectoris, or coronary occlusion, or could he have had a dissection into his aorta, or was it a good-sized pulmonary embolism, or did he have an occlusion of his aorta, or an embolic affair in some peripheral vessel, renal or mesenteric, or could he possibly have had a coronary embolism? I am going to say that he showed the rheumatic heart lesions that I have mentioned. He may have had multiple pulmonary infarcts. He may have had a complicated condition in the region of the aortic valve. Dr. Mallory has a most extraordinary collection of weird aortic lesions. It seems as if this patient had a high degree of coronary obstruction, perhaps at the coronary ostia; there might even have been some local dissection of the aorta in this region. He may have had an embolic occlusion of some branch of the aorta farther down. I always keep in the back of my mind the fact that these cases may be syphilitic because we had one man here at the age of twenty-nine on whom we made a diagnosis of rheumatic heart disease with an aortic lesion and severe angina pectoris, and a sympathectomy was done for relief. After he was operated on, the blood serologic findings came back positive, and he died suddenly thirteen days later with a very active syphilitic process in the aorta. I think all the evidence in this case, however, points in the other direction.

DR. WYMAN RICHARDSON: I want to say that the terminal events seem to me very much like a rupture of a vessel. Therefore, I should lean toward syphilis.

DR. SPRAGUE: I shall commit myself to a diagnosis of rheumatic heart disease with aortic regurgitation and stenosis and mitral stenosis. The final episode suggests a vascular occlusion or a vascular rupture. If I leaned toward syphilis, I

should say rupture, but since I have leaned toward rheumatism, I say coronary occlusion.

DR. MCGINN: The first attacks of angina pectoris apparently were associated with paroxysmal auricular tachycardia or fibrillation. Later on when I saw the patient he had an irregular pulse, apparently owing to extrasystoles, for the electrocardiogram showed no fibrillation. Aminophyllin by mouth gave very striking relief for about four months — much more than had been anticipated. When I heard of the final episode, and after having advised salyrgan, I thought it was the kidney reaction that one sees sometimes after mercurial diuretics. I telephoned the patient's house and found that the pain had preceded the injection by about eight hours, so that such a kidney reaction could not be the explanation.

CLINICAL DIAGNOSES

Rheumatic heart disease.
Congestive failure.

DR. SPRAGUE'S DIAGNOSES

Rheumatic heart disease.
Aortic regurgitation and stenosis.
Mitral stenosis and slight regurgitation.
Multiple pulmonary infarcts.
Terminal arterial occlusion, ? site.

ANATOMIC DIAGNOSES

Rheumatic heart disease, chronic, with aortic and mitral stenosis and slight tricuspid endocarditis.
Cardiac hypertrophy.
Chronic passive congestion of lungs, liver and spleen.
Hydrothorax, bilateral.
Chronic pulmonary tuberculosis, bilateral, healed apical.
Arteriosclerosis, minimal, aortic and coronary.

PATHOLOGICAL DISCUSSION

DR. MALLORY: The post-mortem examination showed rheumatic heart disease. The heart was much enlarged, weighing 640 gm. There was aortic stenosis and regurgitation and mitral stenosis, some involvement of the tricuspid valve and definite thickening without significant deformity. Both ventricles were hypertrophied, which explains the lack of axis deviation. There were no thrombi in any of the cardiac chambers and no infarction anywhere in the body. There were no pulmonary emboli. The lungs were deeply congested, with the heavy stiff texture that one sees in the most chronic type of pulmonary congestion. Very little fluid could be expressed by

pressure. There was no anatomic cause, however, for the suddenness of the terminal episode. The coronary arteries showed a few small atheromatous plaques, but nothing that caused any significant narrowing. On the posterior surfaces of the aortic cusps there were large calcareous masses projecting into the sinuses of Valsalva. The question has often been raised in such cases whether these masses ever impinge on the coronary ostia. Since the blood flow in the coronaries occurs in diastole, one would expect the aortic ring to be stretched to its limits at this time, which seems a little unlikely.

DR. SPRAGUE: I wonder how nitroglycerin could relieve a person with angina pectoris based on obstruction in the sinuses of Valsalva. Could it, by peripheral vascular relaxation, open up the sinuses?

DR. MALLORY: I do not know. It should lower the blood pressure and collapse the aorta rather than dilate it further. Certainly I think one can say that there was no good anatomic evidence of any coronary narrowing, despite the long history of angina.

CASE 27122

PRESENTATION OF CASE

A fourteen-year-old-boy entered the hospital complaining of pain in the right knee.

The patient felt well until six weeks before admission, when he became tired, easily fatigued and complained of general malaise. A week later and coincident with a chill he noticed pain in his right knee while walking; it increased in severity over the next few days to a point where it was present at rest. At this time he developed a cold; weakness, general malaise and pain increased, so that he went to bed of his own volition and remained there until the time of admission. During the weeks before entry, he suffered from several chills, night sweats and anorexia. The pain in the knee was aggravated by motion and varied in severity, so that sometimes even the weight of the bedclothes hurt. "The pain went off and on like a light flashing." For two or three days two weeks before admission fleeting pains developed in the right hip and ankle and in the muscles of the leg, lasting for perhaps four or five minutes and then fading. At this juncture the patient also noticed that he was unable to extend his knee fully. No history of trauma could be elicited. The patient stated that he had been subject to furuncles and boils for some time. There had been a weight loss of 15 pounds since the beginning of the illness.

One sister was being treated for rheumatic fe-

ver. A year previously the patient had been examined in another hospital, but apparently no abnormalities were found.

On physical examination the patient was rather poorly developed and poorly nourished, and he looked tired and ill. Two small furuncles were present on the upper lip, and one on the lower. The heart, lungs and abdomen were normal; the blood pressure was 125 systolic, 68 diastolic. There was a 4.4-cm. atrophy of the right thigh, but no wasting of the calf. The right knee was held in 20° flexion, but could be corrected passively. Free motion was present between 20° and 75° flexion without discomfort, but beyond these points pain was felt. At the medial aspect of the lower end of the right femur immediately proximal to the femoral condyle, there was a firm, slightly tender fullness. There was no redness or obvious increase in skin temperature over this fullness; the knee joint did not appear to be involved in the process, and there was no increase in fluid or thickening of the synovia.

The temperature was 101.5°F., the pulse 120, and the respirations 24.

The urine was normal. Examination of the blood showed a red-cell count of 4,700,000 with a hemoglobin of 75 per cent, and a white-cell count of 14,000 with 87 per cent polymorphonuclears. The sedimentation rate was 42 mm. in one hour. The serum protein was 7.3 gm., the calcium 9.9 mg. and the phosphorus 4.8 mg. per 100 cc., and the phosphatase was 6.3 Bodansky units. A blood Hinton test was negative, the tuberculin test was negative in dilutions of 1:10,000, 1:1,000 and 1:100.

An x-ray film of the knee showed an area of destruction in the distal medial end of the right femur close to the epiphyseal line, but not crossing it. The cortex showed destruction in parts, and there was periosteal new-bone formation along the extent of the lesion, with some amorphous areas of calcification in the soft tissues outside the stratified new-bone formation. Some soft-tissue swelling was present, but a definite soft-tissue mass was not outlined.

For the next few weeks the temperature ran between 99 and 101°F., and the white-cell count averaged 12,000. Three weeks after admission an operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. THOMAS J. ANGLEMI: May we see the x-rays?

DR. GEORGE W. HOLMES: I am familiar with the case, and I cannot improve very much on the description in the text. I might point out one

or two things. First, the lesion does not cross the epiphyseal line, and we stressed that fact in our report. It is true that tumors are less likely than infections to cross an epiphyseal line, but infections do not always cross the line. I think that sign has been overevaluated. The process in the bone is largely destructive. There is rather more destruction than new-bone formation. The primary process is a destructive one, with reaction in the periosteal tissue around it, which is a little in favor of infection. I think the benign tumors are out; we do not need to discuss them to any extent. To my mind the problem is between an infection and a malignant tumor. I should also call attention to the character of this proliferation. That is typical spicule formation such as one sees in malignant tumor. It can occur in infections, but it is not typical.

DR. GRANTLEY W. TAYLOR: Do you want to comment on the presence or absence of the soft-part tumor in association with this, or the presence of edema in the subcutaneous tissue?

DR. HOLMES: Soft-tissue tumor is much more likely to be present in a malignant tumor than it is in an infection. It is a localized, sharply defined tumor, whereas in infection there is diffuse swelling and edema over the whole area; however, edema may occur in malignant tumors, and it may sometimes be absent in infection. It is only a matter of probability. Of course, the amount of swelling in this case is not what one would expect to see in a large malignant tumor. We thought that there was some edema. There is no well-defined soft-tissue tumor.

DR. ANGLEM: This record at first reading left me with a very strong impression that we were dealing with an acute hematogenous osteomyelitis that had passed over into a subacute or semi-chronic phase. We have a boy of fourteen, an age when this disease is common. He complained of fatigue and malaise, following which he had the sudden appearance of pain in the right knee, which was ushered in with a chill. The pain increased in severity in succeeding weeks. Then he had additional chills, night sweats and anorexia, and shortly before admission he was unable to extend his knee. On admission his temperature was 101.5°F., the white-cell count 14,000 with 87 per cent polymorphonuclears, and there was a mild anemia. On examination of the knee, we found that on palpation a firm, slightly tender fullness was observed, without redness of the skin over the area and with no evidence of joint involvement, no evidence of reactive synovitis or of fluid in the joint.

There are certain inconsistencies, however, that

raise some doubt of the correctness of this diagnosis. For example, this boy is said to have had pain that increased over the first few days after the onset, and at the end of a few days was present at rest. In other words, we must conclude that then he was up and about, which we should hardly expect him to be if he had come down with osteomyelitis from an organism of sufficient virulence to cause chills. He apparently did not take to bed until several days after the onset, when malaise and weakness finally made their appearance. In other words, the toxemia that we associate with acute hematogenous osteomyelitis must have been absent or very slight. We might explain that by assuming that the organism was of low virulence. If that were true, we should hardly expect the sudden onset with chill; we should like to know more about the chills. Were they genuine rigor or merely chilly sensations that might be associated with any fever? We should also like to know if a blood culture was taken, and if so, what the report was.

DR. TRACY B. MALLORY: There were no blood cultures. Here is the preoperative chart. The highest recorded rectal temperature is 101°F., and the highest by mouth is 100.

DR. ANGLEM: What other possibilities are there? I still reserve judgment, but I think that at least there is some doubt as to the presence of a pyogenic infection here. The negative blood Hinton test and a negative tuberculin in a dilution of 1:100 make it unnecessary to regard seriously either syphilis or tuberculosis. The clinical course is not typical of either. Syphilis of bone would be extraordinarily rare at this age, and the location of the lesion in the metaphysis rather than the epiphysis is against the diagnosis of tuberculosis. The malignant tumor that is most likely to simulate osteomyelitis and to be confused with it is Ewing's sarcoma. It is very frequently characterized by fever, leukocytosis and pain such as is present in this case; but the mode of onset in most cases is quite different from what we have observed here. The characteristic syndrome is one of rather mild pain coming on intermittently at intervals over a long period of time—several months, even as long as a year. The intervals of pain may or may not be associated with fever and leukocytosis, but in most cases there is a rather long duration of the illness before the patient is finally obliged to take to bed, in contrast to a few days in this case. Moreover, Ewing's tumor in the vast majority of cases, although we have just seen an exception, is situated in the shaft of the bone, and this lesion does not seem to me particularly to suggest Ewing's sarcoma by x-ray, al-

though I do not believe it can be ruled out entirely. This disease does occur in this area in rare cases and can present itself in atypical forms that are difficult to diagnose. I neglected to mention, and it may be of some importance later in the discussion, that the patient described the pain as "coming on and off like a light flashing"; we are more accustomed to see that type of pain associated with tumor than with osteomyelitis. To go back to Ewing's tumor again, it is most often confused with the subacute or chronic type of osteomyelitis, which we might well have here.

In contrast, osteogenic sarcoma in certain forms is likely to simulate an acute osteomyelitis in onset. Unlike Ewing's tumor, the pain, once it starts, is persistent with no letup for any appreciable length of time. Certain forms of osteogenic sarcoma are associated with fever and leukocytosis and pain, particularly the osteolytic type, which occurs in young people frequently in and around this age—fourteen to twenty. We have to consider it seriously here, and in support of this diagnosis and against the diagnosis of osteomyelitis I think we might point out that nowhere in the history is there any indication of appreciable swelling, redness or marked tenderness in association with this lesion, which at the time of examination was described as a slightly tender fullness with no real appreciable swelling. So far as we know the skin was not red, and there was no inflammatory reaction in the adjacent joint. All these factors, I believe, are in accord with the diagnosis of tumor rather than osteomyelitis. The x-ray picture can fit either diagnosis.

I think that the diagnosis in this case hinges on interpretation of the story, particularly the story of chills. If we knew definitely that these were real shaking chills, I should favor strongly the diagnosis of osteomyelitis that has gone over into a subacute phase, but I am inclined to dis-

count the story of chills and furuncles because of the peculiar way in which the point is interjected into the story. It is said that at some time in the past the patient had furuncles, but there is no definite indication that he had furuncles immediately preceding these symptoms. I hesitate to discount the story of chills, but considering the whole picture I should favor a diagnosis of osteolytic osteogenic sarcoma.

CLINICAL DIAGNOSIS

Bone tumor?

DR. ANGLE'S DIAGNOSIS

Osteogenic sarcoma, osteolytic type.

ANATOMICAL DIAGNOSIS

Subacute osteomyelitis of the femur.

PATHOLOGICAL DISCUSSION

DR. MALLORY: The preoperative consensus was that this was a malignant tumor, but a good deal of difference of opinion was expressed. Have you any comment, Dr. Taylor?

DR. TAYLOR: No, I think Dr. Anglem discussed all the points and more than the ones we took into consideration.

DR. HOLMES: May I ask whether he had any chemotherapy?

DR. MALLORY: I think not. I can see no report of it.

It was decided to biopsy this lesion with a pathologist on hand for a frozen section, and to be prepared for amputation, if it should be necessary. At the biopsy, frank pus was found, and cultures showed *Staphylococcus aureus*. The material curetted from the margins of the cavity showed acute and chronic inflammation, so that I think tumor is certainly ruled out.

The New England Journal of Medicine

Formerly the

Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
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MATERIAL for early publication should be received not later than noon on Saturday.

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COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

MEDICAL ADVISER TO THE MASSACHUSETTS DEPARTMENT OF PUBLIC WELFARE

THE appointment of a medical adviser to the Massachusetts Department of Public Welfare, as noted elsewhere in this issue of the *Journal*, is an important step forward, with many implications as to future developments. The well-known relation between poverty and disease, with a consequent overlapping, makes this position a crucial one. It has been assumed that there is a causal link between poverty and disease, some emphasizing poverty as a cause of disease, and others, disease as a cause of poverty. Although both these points of view are undoubtedly to some extent justified, it is perhaps also true that they are but twin

sisters of those great parents of all misery—ignorance and vice.

The profession awaits with interest the developments that will come from this appointment.

ROBERT FORTESCUE FOX

IN the death of Dr. Robert Fortescue Fox, of London, England, on June 15, 1940, in his eighty-second year, there passed one of the most significant influences operative in the world toward bringing about that acceptance of the importance of the rheumatic diseases which exists today and is everywhere on the increase. Dr. Fox came of a medical family and was a member of the Society of Friends. His personality and work were characterized by those qualities of kindness, consideration and purpose which the world has learned to associate with that sect, and he was buried very near the grave of one of the greatest apostles of the order, William Penn.

Perhaps partly as a result of his own early struggle with tuberculosis, he was something of a medical fundamentalist and entertained a profound belief in the efficacy of natural defenses and agents, when properly co-ordinated, in the treatment of disease. Using physical agents, first empirically and later on the basis of controlled observations, he became an authority in the field of physical therapy and spa treatment. Of him Sir Humphry Rolleston writes, "He was a gentle though persistent pioneer of physiotherapy and spa treatment, persuasive by his convictions rather than dictatorial."

In addition to numerous contributions to medical literature, Dr. Fox was the founder and editor of the *Archives of the International Society of Medical Hydrology*. He was a leading spirit in starting in London the Red Cross center for the treatment of rheumatic diseases and was active in the development and provision of adequate facilities for the care of ex-service men.

Active to the last, he recently advocated a program for a Committee for Research on Delicate Children, and on the day of his death a letter appeared from him in the London *Times* on the need

for a properly organized system of physical treatment for the troops.

Dr Fox's greatest contribution was probably in connection with his untiring and persistent efforts in founding, with Dr J van Breemen, of Amsterdam, Holland, prior to 1926, the Ligue Internationale contre le Rhumatisme, of which he served as president for many years, retiring after the brilliant sixth congress of the Ligue held in London, Oxford and Bath in March and April, 1938

As a practical idealist he encountered much resistance but lived to see his labors bear wide fruition. It can fairly be said that the pivotal role played by Dr Fox as a pioneer in the field of rheumatic diseases will gather rather than lose significance when the history of the movement to control these disorders is written

MEDICAL EPONYM

GULL'S DISEASE

The article, "On a Cretinoid State Supervening in Adult Life in Women," which has bound the name of Sir William W Gull (1816-1890) to this condition, was read before the Clinical Society of London on October 24, 1873, and appears in the *Transactions* of that society (7: 180-185, 1874)

The remarks I have to make upon the above morbid state are drawn from the observation of five cases. Of two of these I am able to give many details, but the three others were only seen by me on one or two occasions

CASE I

Miss B after the cessation of the catamenial period, became insensibly more and more languid, with general increase of bulk. This change went on from year to year, her face altering from oval to round, much like the full moon at rising. With a complexion soft and fair, the skin presenting a peculiarly smooth and fine texture was almost porcelainous in aspect, the cheeks tinted of a delicate rose purple, the cellular tissue under the eyes being loose and folded, and that under the jaws and in the neck becoming heavy, thickened and folded. The lips large and of a rose purple, alae nasi thick, cornea and pupil of the eye normal, but the distance between the eyes appearing disproportionately wide, and the rest of the nose depressed, giving the whole face a flattened broad character. The hair flaxen and soft the whole expression of the face remarkably placid. The tongue broad and thick, voice guttural, and the pronunciation as if the tongue were too large for the mouth (cretinoid). The hands peculiarly broad and thick spade-like, as if the whole textures were infiltrated. The integuments of the chest and abdomen loaded with

subcutaneous fat. The upper and lower extremities also large and fat, with slight traces of oedema over the tibiae, but this not distinct, and pitting doubtfully on pressure. Urine normal. Heart's action and sounds normal. Pulse, 72, breathing, 18

Such is a general outline of the state to which I wish to call attention

R W B

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

MATERNAL MORTALITY IN MASSACHUSETTS

The cases that have been appearing in the *Journal* on obstetrics and its complications have come in most part from the files of private cases in the practice of members of the Committee At Large of the Section of Obstetrics and Gynecology. They have been grouped to illustrate specific conditions. Beginning with this issue and continuing for an indefinite time, cases will be reported from the Maternal Mortality Study in Massachusetts during the last four years. In general, the form of the cases already reported will be followed, of necessity some details may be absent. No attempt will be made to group cases according to specific complications. All these cases, of course, were fatalities

A twenty eight year-old primipara was said to have been seen when about three months pregnant. The physical examination at that time was essentially negative. The heart was not enlarged, there were no murmurs. The lungs were clear and resonant, there were no rales. The pelvic measurements were normal. The blood pressure was said to be normal. The uterus was enlarged to a size consistent with the period of amenorrhea.

The patient was seen in the fifth and seventh months but not again until labor started at term by the rupture of the membranes. After a labor, which was said to have been only four hours in duration, an attempt at forceps delivery was made. When this procedure was unsuccessful, a version was attempted. It was reported that a contraction ring was present and that the patient bled very freely. A consultation was held, but the patient died undelivered.

Comment This case represents obstetrics at its worst. The prenatal care was absolutely inadequate.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

quate. The patient was seen but three times during her pregnancy, and an interval of at least six weeks occurred between the last visit and the onset of labor. The consultant believed that the pelvis was adequate, so that the need of an elective cesarean section because of definite disproportion did not exist. It is conceivable that a primipara after four hours of labor might attain full dilatation. The history of this case suggests that this was not so. Had complete dilatation been present with a head well engaged, it is impossible to believe that forceps delivery would have failed. That it did fail leads one to the probable inference that complete dilatation was not present, and that in an attempt to dilate the cervix manually so that forceps could be applied the head was disengaged and made the operation difficult even in the hands of the best-trained men. When in the hands of the operator forceps were found inefficient and version was attempted, it is most likely that the uterus was ruptured, causing excessive external and concealed hemorrhage. Such results can in no way be justified, and so long as hospitals in Massachusetts allow such procedures and do not regulate all obstetric operating, these results will be repeated.

COMMITTEE ON STATE AND NATIONAL LEGISLATION

At its meeting on February 5, the Council voted to oppose the following bills, which have been reported favorably by the Committee on Public Health:

H. 114. Bill (accompanying House No. 113, recommendations of the Board of Registration in Medicine) relative to providing for the annual registration of physicians and the biennial publication of the list of physicians duly registered.

H. 115. Bill (accompanying House No. 113, recommendations of the Board of Registration in Medicine) relative to the recording of the certificate of registration of a qualified physician by the town clerk.

H. 116. Bill (accompanying House No. 113, recommendations of the Board of Registration in Medicine) relative to establishing a special commission to investigate and study the advisability and practicability of requiring special qualifications of all physicians who engage in the practice of surgery.

H. 114 and H. 115 have been referred to the Committee on Ways and Means, whose members are as follows:

Committee on Ways and Means: Senators Arthur W. Hollis, 90 Washington Street, Newton, Senate Chairman; Harris S. Richardson, 15 Mt. Pleasant Street, Winchester; Cornelius F. Haley, Main Street, Rowley; Laurence Curtis, 15 River Street, Boston; Joseph L. Murphy, 57 Samoset Street, Boston.

Representatives Albert F. Bigelow, 246 Dudley Street, Brookline, House Chairman; Walter R. Baylies, 48 William Street, Taunton; James A. Peckham, 2 Upland Road, Wellesley; Paul W. Foster, North Plain Road, Great Barrington; Douglass B. Francis, 35 Meadowbrook Road, Newton; Albert Bergeron, 35 Mt. Vernon Street, Lowell; Charles H. Roberts, Jr., Salem End Road, Framing-

ham; Robert S. Backus, Nantucket; Nathaniel Tilden, 37 Elm Street, Scituate; Richard J. White, Jr., 8 Upham Road, Lynn; Anthony R. Doyle, 150 Beacon Street, Worcester; James F. Tobin, 117 Mason Street, Salem; Patrick G. Sullivan, 92 Codman Hill Avenue, Dorchester; Joseph H. Downey, 254 Main Street, Brockton; Jeremiah D. W. Crowley, 462 Washington Street, Brighton.

H. 116 has been referred to Committee on Rules, the members of which are the following:

Committee on Rules: Senators Angier L. Goodwin, 33 Reading Hill Avenue, Melrose, Senate Chairman; Jarvis Hunt, 51 High Street, North Attleboro; Newland H. Holmes, 83 Webb Street, Weymouth; Donald W. Nicholson, Highland Road, Wareham; Mason Sears, West Street, Dedham; David M. Brackman, 52 Brookledge Street, Dorchester; Chester A. Dolan, Jr., 987 Parker Street, Jamaica Plain.

Representatives Christian A. Herter, 61 Beacon Street, Boston, House Chairman; William A. Jones, Main Street, Barnstable; Rudolph F. King, 163 Exchange Street, Millis; Alfred M. Bessette, 171 Query Street, New Bedford; William R. Gilman, 83 Fellsmere Road, Malden; William A. Akeroyd, Prospect Street, Lanesborough; Fred A. Hutchinson, 36 Savory Street, Lynn; Hiram N. Dearborn, 86 Electric Avenue, Somerville; Nelson B. Crosby, 10 Davis Avenue, Arlington; Fred B. Dole, Shelburne; John E. Troy, Jr., 54 Pleasant Hill Avenue, Dorchester; Joseph N. Roach, 561 Main Street, North Adams; Andrew J. Coakley, 19 Bell Street, Chicopee.

If the members of either of these committees come from your district, be sure to write to them, asking them to defeat the bills in their committee, and in any event, write to your representative and ask him to vote against the bills when they reach the floor of the House of Representatives.

The following bill is scheduled for hearing at the State House during the week of March 24:

March 27

H. 870 (Public Health). Petition of the Massachusetts Mothers' Health Council for legislation to protect working women before and after childbirth. The aims and purposes of this bill are endorsed. *Favored.*

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning March 23:

BERKSHIRE

Thursday, March 27, at 4:30 p.m., in the Bishop Memorial Building, Pittsfield. Chemotherapy in the Treatment of Gonococcal Infection. Instructor: Weston T. Buddington. Harry G. Mellen, Chairman.

BRISTOL SOUTH (Fall River Section)

Tuesday, March 25, at 4:30 p.m., at the Union Hospital, Fall River. Obstetric Complications, with Case Histories and Clinical Problems. Instruc-

tor James C Janney Howard P Sawyer,
Chairman

ELLEN

Thursday, March 27, at 8 00 p.m., in the Library of the Franklin County Public Hospital, Greenfield Management of Abdominal Distention In-
structor Hollis L. Albright Halbert G Stetson,
Chairman

PDEN

Wednesday, March 26, at 4 00 p.m., at the Academy of Medicine, Professional Building, 20 Maple Street, Springfield, and at 8 00 p.m., in the Out patient Department of the Skinner Clinic, Holyoke Hospital, Holyoke. Diagnosis and Treatment of Minor Lesions in Rectum and Anus
Instructor E. Parker Hayden Alfonso A Palermo, *Chairman*

PSHIRE

Thursday, March 27, at 4 15 p.m., in the Nurses Home of the Cooley Dickinson Hospital, Northampton Infections of the Hands and Feet.
Instructor William E Browne Robert C Byrne,
Chairman

CESTER

Tuesday, March 25, at 8 30 p.m., in the Nurses Home of the Milford Hospital, Milford Pediatric Case Discussions Instructor Warren R Sis-
son Joseph Ashkins, *Chairman*

CESTER NORTH

Friday, March 28, at 4 30 p.m., in the Nurses' Home of the Burbank Hospital, Fitchburg Technique and Treatment of Primary, Secondary and Tertiary Syphilis Instructor Rudolph Jacoby
George P Keaveny, *Chairman*

ATHS

CLEAVES—EDWIN N CLEAVES, M.D., of Boston, died January 24. He was in his fifty-second year. Dr Cleaves received his degree from Harvard Medical School in 1915. He was a member of the Massachusetts Medical Society, the American Medical Association, the American Roentgen Ray Society, the New England Roentgen Ray Society and the American College of Radiology.

SHEA—PETER O SHEA, M.D., of Worcester, died March 9. He was in his seventy-second year. Born in Worcester, he graduated from Holy Cross College and received his degree from Columbia University College of Physicians and Surgeons in New York City in 1895. He received an M.A. degree from Holy Cross College in 1896.

Dr Shea was a former trustee of the Grafton State Hospital having served for six years in that capacity. He was Director of the Board of Health at Worcester at the time of his death and had been a member of the Board since 1925. He was a fellow of the Massachusetts Medical Society and of the American Medical Association. His daughter, a sister and a brother survive him.

SIMMONS—LT COL. RALPH H SIMMONS, M.D., of Fort Adams Rhode Island, died March 13 at the Walter Reed Hospital Washington, D.C. He was in his fifty-third year.

Born in Brockton, he attended the local schools there and received his degree from Tufts College Medical School in 1913. For the next three years he was resident physician at the Union Hospital, Fall River. He had served overseas during World War I and at the time of his death was post surgeon at Fort Adams, Rhode Island.

He was a fellow of the Massachusetts Medical Society and the American Medical Association, and held memberships in the American Academy of Ophthalmology and Oto-Laryngology and the American College of Surgeons.

His widow, a son and two sisters survive him.

WORTHING—FRANK B WORTHING, M.D., of Chatham died March 13. He was in his seventy-second year.

Born in Hallowell, Maine he received his degree from the Bowdoin Medical School in 1896. He was a member of the Massachusetts Medical Society, the American Medical Association and the Cape Cod Medical Association.

His widow, a daughter and a son survive him.

MISCELLANY

MEDICAL ADVISER TO THE MASSACHUSETTS DEPARTMENT OF PUBLIC WELFARE

Dr B W Mandelstam was recently appointed medical adviser to the Massachusetts Department of Public Welfare. Born in Boston, he graduated from Tufts College Medical School in 1932 and later served an internship at the Lynn Hospital. Then followed seven years of active general practice in Bridgewater, where he had an opportunity for close contact with the medical problems of welfare recipients and welfare boards, as well as insight into the physician's attitude toward these problems. He will act as an adviser to the department in all matters relating to medical care. It is hoped that this appointment will be an aid to the medical profession in the recognition that welfare activity is both a professional and civic duty. It is also hoped that the profession will co-operate with him and the department in keeping such care on a high professional plane, at the lowest possible cost, as a means of continuing our present system of free choice of physician.

Plans have been made for the appointment of an advisory committee to be composed of persons representing the various professions concerned with the medical care of the needy, as an aid to working out a satisfactory program.

IMPORTANCE OF THE TUBERCULIN TEST

Methods for finding cases of tuberculosis have not yet been reduced to a standardized pattern. Experience has prompted certain changes, and practical considerations make it necessary to eliminate wasteful methods. Pressed by the need for economy some workers now place almost sole reliance on the x-ray and seem ready to discard the tuberculin test as a selective screen. Among those who believe that the tuberculin test is still of great importance is Myers. In a recent paper (Tuberculosis in students, *Am Rev Tuberc* 43 235 244, 1941) he delineates his conception of tuberculosis, which some may not accept in practice but which furnishes food for thought. An abstract of the discussion follows.

Ten years ago to say that a student had tuberculosis really meant that he had consumption. It was the tuberculosis diagnosed by the ancient Chinese, Babylonians

Greeks and all since their time. A more recent and more logical conception of tuberculosis is that it begins when the first neutrophil phagocytizes a tubercle bacillus, and that the outcome depends on subsequent physiologic events. From three to seven weeks after tubercle formation begins, the tissues are sensitized to the protein fraction of the tubercle bacillus, and apparently remain sensitized so long as tubercle bacilli are alive in the body. This sensitivity is determined by the tuberculin test. The tubercles may be microscopic in size, and there is no way of determining in a given person whether clinical tuberculosis will ever make its appearance. Since the body is seeded with tubercle bacilli, clinical lesions may appear at any time and in almost any place. Therefore, all who react to tuberculin have tuberculosis.

The acceptance of this idea is imperative, says the author, because it is the only conception that will lead us to the control of the disease. Normal appearance and normal x-ray shadows in a positive reactor do not justify looking lightly on the condition. Inspection of the chest does not include the entire lung, and some lesions may be too small to cast shadows. Moreover, clinical tuberculous lesions may develop in many parts of the body other than the lung.

Even if we could be certain that in the tuberculin reactors there are at the moment no lesions except those of the primary complexes, we have no way of determining what minute acute or chronic clinical lesions will develop or where they will be located. The reactor whose complete examination is negative today may have tuberculous meningitis, miliary disease, tuberculous pneumonia, peritonitis, pleurisy with effusion or synovitis, tomorrow.

Chronic clinical tuberculosis is essentially a disease of adults—it begins to get into its stride only in the college and university age period. Therefore, one finds only a small percentage of positive tuberculin reactors with chronic, clinical tuberculous lesions during their few student years, yet it is of great importance that their disease be detected before it becomes contagious.

Occasionally one asks why it would not be better to omit the tuberculin test and proceed directly to the x-ray film inspection of the chest, since the occasional person has spoken of this inspection as the best case-finding method. No student of tuberculosis could be satisfied with such a procedure because the x-ray film examination is totally inadequate in determining the true tuberculosis situation in any student body. Such examination is limited to a small part of the body; indeed, it does not include more than 75 per cent of the lungs themselves. Moreover, it reveals evidence only of gross lesions and does not differentiate these with reference to etiology, tuberculous or nontuberculous. We divide pathology into gross and microscopical for teaching and practical purposes. The x-ray reveals only the gross. For example, among those who have primary tuberculosis complexes in the body, the x-ray film of the chest reveals evidence of their presence in only approximately 10 to 15 per cent. The student of tuberculosis demands something far more delicate than the x-ray film and he finds it in the tuberculin test.

It would be as futile to try to control tuberculosis without the tuberculin test as to try to control syphilis without the Wassermann or an equally good test. At the University of Minnesota we have in the neighborhood of 4500 entering students each year and the tuberculin test indicates that approximately 1000 of them have the first-infection type of tuberculosis somewhere in their bodies; that is, primary tuberculosis complexes have been established, and to us the tuberculin reac-

tion means that living tubercle bacilli are present. Among our reactors, only 100 to 150 present any evidence that might be interpreted as representing the primary tuberculosis complex on the x-ray film of the chest. Of the entire 1000, rarely more than 10 to 15 have, at the moment, lesions in the lungs which cast shadows that might be due to the clinical form of pulmonary tuberculosis. Thus, if we depended entirely on the x-ray film examination, we would overlook 85 per cent or more of the students who actually have tuberculous lesions in their bodies. Each of the 1000 students who reacts to the tuberculin test is a potential clinical case of tuberculosis some time in life and in the occasional one this form of the disease will actually occur while in school. Therefore, we feel that this group of 1000 students should be listed and observed from year to year for clinical tuberculosis, just as one lists those who have not been immunized against smallpox or diphtheria as the susceptibles in case of an outbreak of one of these diseases on the campus.

Experience in eradicating tuberculosis in cattle justifies our faith in the tuberculin test.

The veterinarians of this country have made more than 217,000,000 tuberculin tests on cattle between 1917 and 1939. The carcasses of more than 3,700,000 reactors were examined postmortem, and the accuracy with which the test selected those with tuberculous lesions was little short of miraculous. Indeed, it was only through the tuberculin test as the detective that tuberculosis has been almost eradicated from the cattle herds of this nation.

Of course no tuberculosis program is complete that stops with the tuberculin test. Reactors should have a chest x-ray examination, preferably by film inspection, although the fluoroscope in the hands of an expert may equal the film inspection. Those students with shadows of lesions must be examined in considerable detail, and in those with shadows that persist, laboratory examinations, including the search for tubercle bacilli in the gastric contents, must be made.

The author gives the following answer to the question, Must students contract tuberculosis while in college?

No, because we have at our command accurate methods of screening our contagious cases of tuberculosis in any group. Therefore, if we keep students under sufficiently close observation, it is with great rarity that one will enter with contagious disease or will develop it on the campus so as to disseminate it to other students. Thus, the students may be prevented from contracting tuberculosis from one another. . . . It is true that the occasional student will become infected through contact with a contagious case entirely apart from the campus. However, in most parts of this country such infections have been reduced to one per cent or less per year. Therefore, few students become infected even in this manner while they are in college.—Reprinted from *Tuberculosis Abstracts*, March, 1941.

NOTICES

HARVARD SCHOOL OF DENTAL MEDICINE

Harvard University announced recently the opening of a five-year course combining medical and dental training. The new school of dental medicine was established for the purpose of training new types of scientific workers, combining the skills of both medicine and dentistry. Next fall, with the opening of the new school, dental students will register in both the School of Dental Medi-

and in the Harvard Medical School for a five year course, taking approximately three and a half years of same medical courses as other students in the medical school, and, in addition, an amount of specific dental training sufficient to qualify them for dental practice graduates will receive both the MD and the DMD degrees

BOSTON MEDICAL HISTORY CLUB

There will be a meeting of the Boston Medical History Club at the Boston Medical Library, 8 Fenway, Boston, Monday, March 24, at 8 15 p m Professor J Walter Wilson, of the Department of Biology, Brown University, will speak on "The Role of Art in the Development of the Natural Sciences in the Renaissance" All interested persons are cordially invited to attend the meeting

MASSACHUSETTS GENERAL HOSPITAL

A meeting of the Hospital Research Council will be held in the Ether Dome of the Massachusetts General Hospital, on Tuesday, March 25, at 5 00 p m

PROGRAM

- Decrease in Cardiac Efficiency Due to Varicose Veins Dr E M Chapman
- The Effect of Evipal upon Two Major Respiratory Drive Mechanisms Drs C A Moyer and H K Beecher
- Mechanisms of Respiratory Failure under Barbiturate Anesthesia (Evipal, Pentothal) Drs H K Beecher and C A Moyer.

TUFTS COLLEGE MEDICAL SCHOOL ALUMNI ASSOCIATION

Professor W Barton Leach, of the Harvard Law School will be the guest speaker at the annual Tufts College Medical Alumni Dinner, at 7 p m, on Wednesday evening, March 26, at the Hotel Somerset. He will discuss "The International Position of the United States and What Do About It." Dr James W Manary, superintendent of medical director of the Boston City Hospital, will preside

Other speakers on the program are Dr Leonard Carichael, president of Tufts College, who will report on the developments to date of the fund raising campaign, Dr Frank R. Ober, who will tell of the Medical Alumni Council's reorganization, and His Honor, Mayor Maurice Tobin, who will bring the greetings of the city of Boston

The dinner will also serve as a special reunion for members of the 1916 class, celebrating their silver anniversary. Simultaneously, the Rhode Island Tufts Medical Club will combine the activities of its annual meeting with the dinner. Dr Harmon P B Jordan, superintendent of the Providence Lying In Hospital, and Dr Charles Gormly, physician-in-chief of the Rhode Island Hospital, Providence, head the Rhode Island delegation

ROBERT DAWSON EVANS MEMORIAL LECTURE

Dr Allen O Whipple, professor of surgery at Columbia University College of Physicians and Surgeons, will give the third in a series of four Robert Dawson Evans Memorial lectures on Friday, March 28, at 8 15 p m, in the Evans Auditorium, 78 East Concord Street, Boston. His subject will be "A Discussion of Certain Splenopathies in Relation to the Vascular Bed of the Spleen" Physicians and medical students are cordially invited to attend

CONSULTATION CLINICS FOR CRIPPLED CHILDREN IN MASSACHUSETTS, UNDER THE PROVISIONS OF THE SOCIAL SECURITY ACT

CLINIC	DATE	CLINIC CONSULTANT
Salem	April 7	Harold C Bean
Gardner	April 8	Mark H Rogers
Haverhill	April 9	William T Green
Brockton	April 10	George W Van Gorder
Lowell	April 11	Albert H Brewster
Northampton	April 16	Garry deN Hough, Jr
Worcester	April 18	John W O'Meara
Pittsfield	April 21	Frank A Slowick
Hyannis	April 22	Paul L Norton
Fall River	April 28	Eugene A McCarthy

MASSACHUSETTS PSYCHIATRIC SOCIETY

The next meeting of the Massachusetts Psychiatric Society will be held at the Massachusetts General Hospital on Friday, March 28, at 8 p m

PROGRAM

- The Anticonvulsive Action of Neoprontosil Drs Stanley Cobb and Mandel E Cohen
- The Conditional Salivary Reflex in Psychoneurotic Patients Drs Jacob E Finesinger and George F Sutherland
- The Evaluation of Changes in Mental Status Produced under Laboratory Condition Dr Erich Linde mann
- Studies in Muscular Tension in the Neuroses Dr Jurgen Ruesch

NEW ENGLAND SOCIETY OF PSYCHIATRY

The annual meeting of the New England Society of Psychiatry will be held at the Fairfield State Hospital, Newtown, Connecticut, on Thursday, April 10. Dr Arthur H Ruggles, superintendent of the Butler Hospital, Providence, Rhode Island, will speak on the subject "Work Therapy Its importance to the patient and to the hospital"

HERMANN M BIGGS MEMORIAL LECTURE

The Hermann M Biggs Memorial Lecture, given under the auspices of the Committee on Public Health Relations of the New York Academy of Medicine, will be delivered by Dr C A Mills, professor of experimental medicine, University of Cincinnati, at the New York Academy of Medicine, on Thursday, April 3, at 8 30 p m. Dr Mills will speak on "The Relation of Climate and Geography to Health"

The medical profession and the public are cordially invited to attend

NEW ENGLAND HEALTH INSTITUTE

The New England Health Institute will be held in Boston on Wednesday, Thursday and Friday, April 2-4. All lectures will be at the Hotel Statler. The Wednesday evening session will be devoted to talks on public health in its relation to national defense measures. Dr Paul J Jakmauh, Commissioner of Public Health in Massachusetts, will preside at this meeting, at which Dr Thomas Parran, Surgeon General, U S Public Health Service, and Miss Katherine Lenroot, Chief, Children's Bureau, U S Department of Labor, will be the speakers. On Thursday evening a dinner and dance will be held at the Hotel Statler. Brigadier General Frederick F Russell, of the

U. S. Army Medical Reserve Corps, will be the speaker at the dinner.

The three-day institute is divided into sixteen sections, covering every field of health work. Four sessions will run concurrently every hour from 9:30 a.m. to 12:30 p.m., and from 2:00 p.m. to 5:00 p.m. The various sections and chairmen are as follows:

SECTIONS	CHAIRMEN
Public-Health Administration	Travis P. Burroughs, M.D., Stanley H. Osborn, M.D.
Cancer and Chronic Diseases	Ludvig Hektoen, M.D., Sc.D.
Communicable Diseases	Roscoe L. Mitchell, M.D., Charles F. Dalton, M.D., Lester A. Round, Ph.D.
Crippled Children	Robert C. Hood, M.D.
Environmental Sanitation	Arthur D. Weston, C.E.
Food and Drugs	Harry E. Barnard, Ph.D.
Genitoinfectious Diseases	Raymond A. Vonderlehr, M.D.
Health Education	Ira V. Hiscock, Sc.D.
Laboratory	Friend Lee Mickle, Sc.D.
Maternal and Child Hygiene	Martha M. Eliot, M.D., Francis V. Corrigan, M.D.
Nutrition	Helen Hinman, S.B.
Occupational Hygiene	Philip Drinker, S.B., Ch.E.
Public-Health Nursing	Pearl McIver, R.N. Hazel V. Dudley, R.N.
School Health	Walter F. Downey, M.Ed.
Tuberculosis	Henry D. Chadwick, M.D.
Vital Statistics	Thomas J. Duffield

Those desiring detailed information should apply to the Massachusetts Department of Public Health, State House, Boston.

THE FOUNDATION PRIZE

The American Association of Obstetricians, Gynecologists and Abdominal Surgeons announces that the annual Foundation Prize for this year will be \$150. Those eligible include only interns, residents or graduate students in obstetrics, gynecology or abdominal surgery and physicians who are actively practicing or teaching obstetrics, gynecology or abdominal surgery.

Competing manuscripts must be presented in triplicate under a nom de plume to the secretary of the association before June 1, be limited to 5000 words and such illustrations as are necessary for a clear exposition of the thesis and be typewritten (double-spaced) on one side of the sheet, with ample margins.

The successful thesis must be presented at the next annual meeting of the association, without expense to the association and in conformity with its regulations.

For further details, address Dr. James R. Bloss, *Secretary*, 418 Eleventh Street, Huntington, West Virginia.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, MARCH 23

MONDAY, MARCH 24

- *11:30 a.m. Carney Hospital. Monthly clinical meeting and luncheon.
- 12:15-1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.
- *8:15 p.m. New England Heart Association. Boston City Hospital, pathological amphitheater.

- *8:15 p.m. The Role of Art in the Development of the Natural Sciences in the Renaissance. Professor J. Walter Wilson. Boston Medical History Club. Boston Medical Library, 8 Fenway.

TUESDAY, MARCH 25

- *9-10 a.m. Handwriting in Neurology and Psychiatry. Dr. J. C. Loring. Joseph H. Pratt Diagnostic Hospital.
- 12:15-1:15 p.m. Clinicoroentgenologic conference. Peter Bent Brigham Hospital amphitheater.
- 5 p.m. Massachusetts General Hospital. Hospital Research Council. Ether Dome.

WEDNESDAY, MARCH 26

- *9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.
- *12 m. Clinicoroentgenologic conference. Children's Hospital.
- 7 p.m. Tufts College Medical School Alumni Association. Hotel Somerset, Boston.

THURSDAY, MARCH 27

- *8:30 a.m. Combined clinic of the medical, surgical, orthopedic and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital, at the Peter Bent Brigham Hospital.
- *9-10 a.m. Syringomyelia. Dr. H. H. Merriitt. Joseph H. Pratt Diagnostic Hospital.
- 12:30 p.m. Community Nursing Council of Boston, Perkins H. Women's Educational and Industrial Union, 264 Boylston Street, Boston.

FRIDAY, MARCH 28

- *9-10 a.m. Some of the Medical Aspects of the Care of Patients with Rheumatic Fever and Rheumatic Heart Disease. Dr. T. D. Jones. Joseph H. Pratt Diagnostic Hospital.
- 8 p.m. Massachusetts Psychiatric Society. Massachusetts General Hospital.
- *8:15 p.m. A Discussion of Certain Splenopathies in Relation to the Vascular Bed of the Spleen. Dr. Allen O. Whipple. Robert Dana Evans Memorial Lecture. Evans Auditorium, 78 East Convent Street, Boston.

SATURDAY, MARCH 29

- *9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

*Open to the medical profession.

MARCH 30 — Free public lecture, Quincy City Hospital. Page 436, issue of March 6.

MARCH 31-APRIL 4 — Sixth Annual Postgraduate Institute of the Philadelphia County Medical Society. Page 349, issue of February 20.

APRIL 2-4 — New England Health Institute. Page 531.

APRIL 3 — Hermann M. Biggs Memorial Lecture. Page 531.

APRIL 10 — New England Society of Psychiatry. Page 531.

APRIL 10 — Pentucket Association of Physicians. Page 263, issue of August 15.

APRIL 21-25 — American College of Physicians. Page 1065, issue of June 20.

APRIL 28-30 — American Academy of Physical Medicine. Scientific session. Hotel Pennsylvania, New York City.

MAY 5-9 — American Association of Industrial Physicians and Surgeons and American Industrial Hygiene Association. Page 484, issue of March 13.

MAY 21, 22 — Massachusetts Medical Society, Boston.

MAY 28-JUNE 2 — American Board of Obstetrics and Gynecology. Page 262, issue of February 6.

JUNE 2-6 — American Medical Association. Cleveland, Ohio.

OCTOBER 14-17 — American Public Health Association. Page 135, issue of January 16.

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

APRIL 2 — Pediatric Problems in General Practice. Dr. Joseph Garland. Addison Gilbert Hospital, Gloucester.

MAY 14 — Relation of the Doctor to the Law. Mr. Leland Powers. New Ocean House, Swampscott.

FRANKLIN

MAY 13 — This meeting will be held at 11 a.m. at the Franklin County Hospital, Greenfield.

NORFOLK

MARCH 25 — Page 484, issue of March 13.

MAY 8 — Censors' meeting. Hotel Puritan.

SUFFOLK

APRIL 30 — Page 604, issue of October 10.

MAY 1 — Censors' meeting. Page 261, issue of February 6.

WORCESTER

APRIL 9 — Hahnemann Hospital, Worcester.

Supper at 6:30 p.m. followed by a business meeting and scientific program.

The New England Journal of Medicine

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VOLUME 224

MARCH 27, 1941

NUMBER 13

ACUTE CHOLECYSTITIS

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A DIFFERENCE of opinion exists today in regard to the treatment of acute cholecystitis. Until a few years ago there was general agreement that a policy of delaying operation until the acute signs and symptoms of the disease had subsided gave the best results. But in recent years the question has been raised as to whether the traditional conservative policy of delay is actually safest and most satisfactory,¹ or whether acute cholecystitis should, like acute appendicitis, be treated with immediate or early operation.

Shortly after this argument began, the cases of acute cholecystitis treated in the Peter Bent Brigham Hospital over a period of twenty years were reviewed to determine the results obtained. It was found that there was no consistent lowering of the mortality rate, which was 107 per cent for the 235 cases treated surgically.² This mortality rate seemed too high, and not in keeping with the general improvement in the care of surgical patients during this period. Accordingly it was decided to vary from the uniform standard policy of delay to determine if possible in each case just when surgery was advisable, whether this appeared to be within a few hours of admission to the hospital in fulminating cases or after several days of conservative treatment.

Since that time each patient entering the hospital has been treated as an individual surgical problem after the following plan of treatment. Once the diagnosis of acute cholecystitis is made, immediate hospitalization is urged, regardless of how slight the signs and symptoms may be. This cannot be accomplished unless the family physician considers the diagnosis of acute cholecystitis, like that of acute appendicitis, mandatory for hospitalization. Hospitalization does not necessarily mean that immediate surgery will be carried out, but merely that general measures will be instituted in preparation for surgery at a favorable time. On admission to the hospital, immediate measures are taken to re-

lieve pain and to establish fluid balance by the intravenous route, the routine laboratory work is done and the extent and severity of the inflammatory process involving the gall bladder are estimated. Signs, symptoms and laboratory data are evaluated frequently. In severe cases, such determinations are made at night as well as during the day. Whether or not early operation is performed depends on the progress of the inflammatory process after such therapy has been instituted. Early operation is carried out if the inflammatory process in the right upper quadrant progresses, or if there are signs of general peritoneal irritation. Stereotyped management in the treatment of acute cholecystitis is unsatisfactory, because each patient is an individual surgical problem, and because the optimum time for operation varies with each case.

An analysis was made of 121 consecutive cases of acute cholecystitis treated by operation in the Peter Bent Brigham Hospital during the last five years to determine the patients' clinical response following the above outlined plan of treatment (Fig 1). Approximately one fourth of the patients entered the hospital either after the acute attack had subsided or in the terminal stages of an acute attack, Group A. A second group, B, slightly smaller, responded promptly to treatment, with a return of the temperature, white-cell count and physical findings to normal within forty-eight hours. This is the type of response that the clinician usually expects, but unfortunately one that does not always occur. About as many patients fell into Group C and had an exacerbation of symptoms after forty-eight hours of conservative treatment as were in Group B, which responded early. Since a clinician cannot foretell which patient will get worse under conservative treatment, this is a strong argument in favor of early hospitalization. The greatest number of patients fell into Group D and required more than three days for the temperature to subside and the signs of inflammation to abate. A few cases, less than 10

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per cent, remained stationary, that is, the temperature, white-cell count and physical findings did not respond to conservative treatment in Group E. In such cases the clinician should be suspicious of acute suppurative cholecystitis, possibly with a localized extracholecystic abscess. The patients

deaths occurred in the last two groups, made up largely of the severe cases. It is apparent that not all cases of acute cholecystitis subside even under ideal treatment. The surgeon, therefore, must observe these patients with acute cholecystitis early and frequently to decide in each case the most suitable time for operation.

Although immediate hospitalization is urged once the diagnosis of acute cholecystitis has been made, regardless of how slight the symptoms may

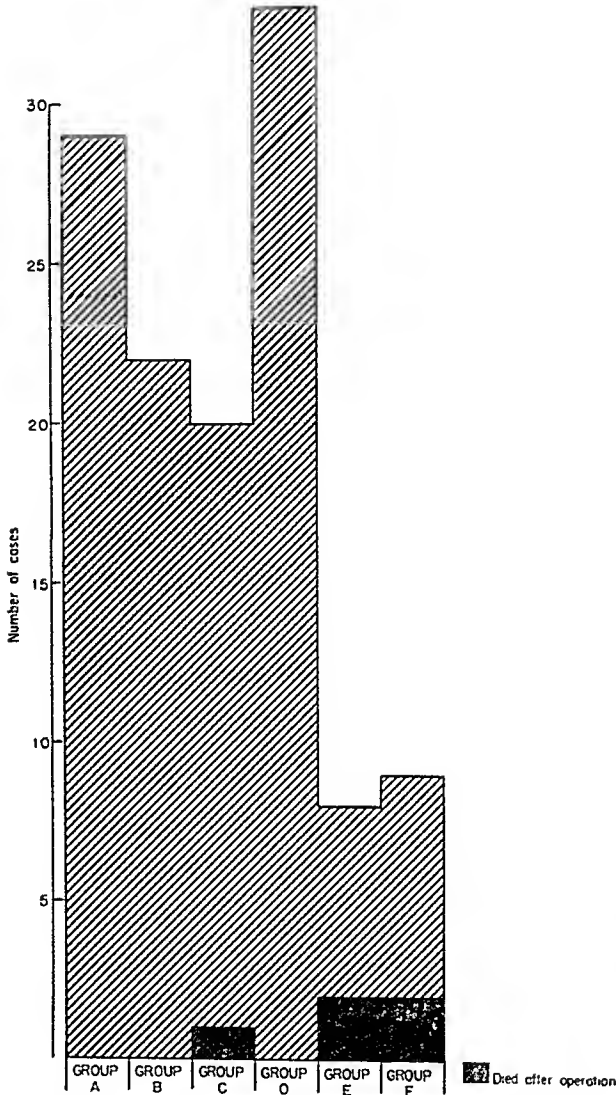


FIGURE 1. Clinical Response to Hospitalization.

Group A: acute signs and symptoms already subsided by time of admission; Group B: acute signs and symptoms promptly subsided in forty-eight hours; Group C: early improvement for forty-eight hours, followed by exacerbation of signs and symptoms; Group D: acute signs and symptoms persisted three days or longer; Group E: acute signs and symptoms persisted without response to conservative treatment; Group F: acute signs and symptoms increased in severity under conservative treatment.

making up Group F presented a fulminating type of infection, with rapid progress of the disease, probably owing to an overwhelming infection. The mechanical and chemical factors do not play an important role in this group. Four of the five

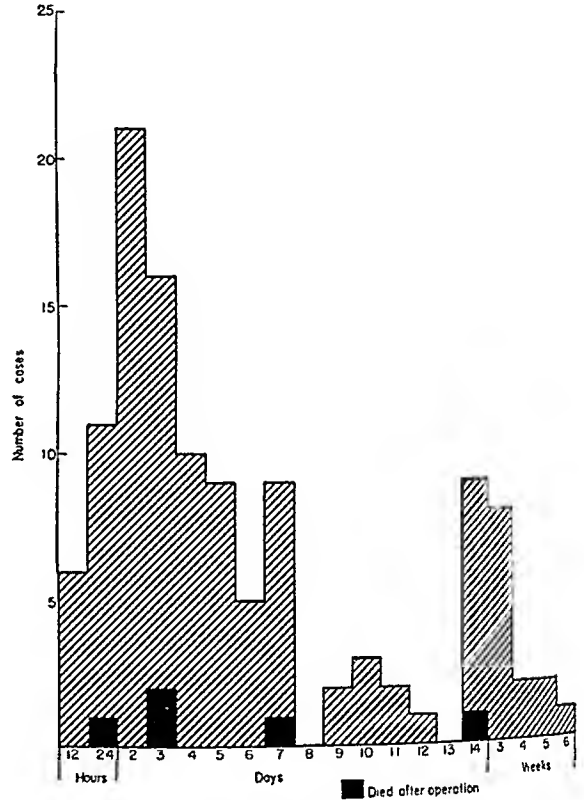


FIGURE 2. Duration of Acute Symptoms before Hospital Admission.

appear to be, as a matter of fact only about one third of the 121 patients in this series were sent to the hospital promptly, so that in the majority of cases, even if it had been desired, operation within forty-eight hours of the onset of the acute attack would have been impossible (Fig. 2). In only 3 cases during the five-year period did it seem advisable to operate on the patient within twelve hours of the time of admission to the hospital (Fig 3). These patients were very ill, and the possibility of a perforated viscus could not be ruled out. In 12 cases operation was performed from twelve to twenty-four hours after admission; in 16, on the second hospital day. In other words, 25 per cent of the patients in the series were operated on within forty-eight hours of admission to the hospital. The remaining 75 per cent were hospitalized seventy-two or more hours before opera-

tion. These figures refer to the period of hospitalization only and bear no relation to the duration of acute symptoms. This important factor, the length of time elapsing from the onset of acute symptoms until operation, is shown graphically in Figure 4. Despite the fact that 25 per cent of the patients were operated on within forty-eight hours of admission, on the basis of time elapsing from the onset of acute symptoms until operation this figure is reduced to 7 per cent. The clinician who first sees the patient must urge hospitalization promptly, so that the surgeon may choose the most suitable time for operation.

The incidence and dangers of perforation have contributed to the differences of opinion in the treatment of acute cholecystitis, for it is recognized

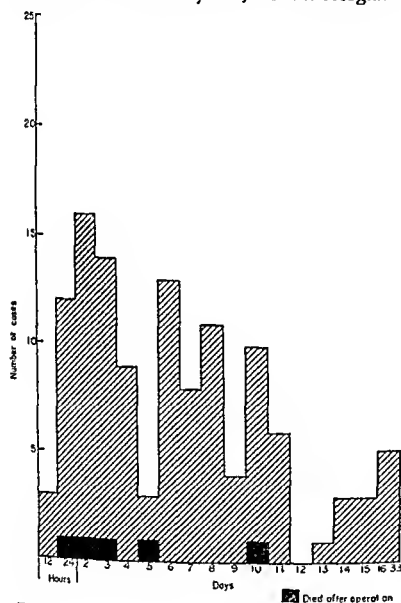


FIGURE 3. Days of Hospitalization before Operation.

that, in general, perforation increases the mortality and that at times the clinician cannot tell which case may result in a perforation of the gall bladder.⁸ As a rule, persistent pain and an increasing leukocytosis with increasing local signs of inflammation or persistent symptomatology under treatment imply that the gall bladder has perforated. However, physical findings and laboratory data do not always give reliable information as to the extent of the pathologic process involving the gall bladder, and for this reason early hospitalization and frequent evaluation of the patient's progress are im-

perative to maintain a low mortality. Except in rare cases, the perforation is walled off by the omentum and adjacent tissue, making an extra-cholecystic abscess. Perforation occurred in 16, or 13 per cent, of the 121 cases under discussion,

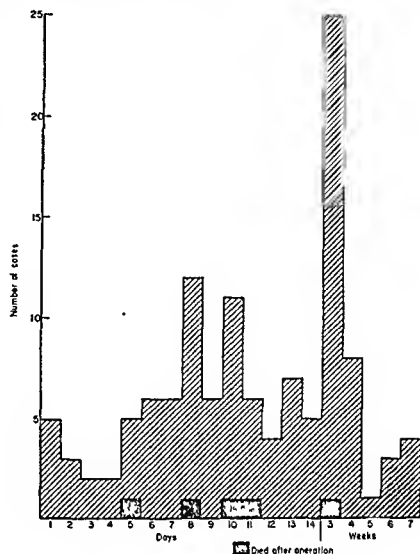


FIGURE 4. Duration of Acute Symptoms from Onset until Operation.

with a mortality of 6 per cent (Table 1). In all but one case, a walled-off abscess resulted. The perforation is rarely free in the peritoneal cavity.

TABLE 1. Incidence of Perforation.

PATHOLOGIC LESION	No of Cases	AVERAGE DURATION OF ACUTE SYMPTOMS BEFORE HOSPITALIZATION
		days
Abscess about fundus	5	7
Abscess about ampulla	4	5
Abscess into liver	4	4
Perforation into intestine	2	2
Free perforation	1	1
Total	16*	

*Seven patients had no previous biliary symptoms

However, there was one case with a free perforation, wherein the omentum was attached to the site of a gastric resection, performed years before.

Postoperative complications were present in 25 patients, approximately 20 per cent of the entire group (Table 2). As would be expected in upper abdominal surgery, a large percentage of these were pulmonary complications, such as atelectasis, with

complications as the result of infection the second most frequent. Each case was evaluated carefully, and any deviation from the normal course, regardless of how slight, was regarded as a complication.

Infection and pulmonary embolus were the chief causes of death (Table 3). In addition to acute

TABLE 2. *Complications.*

COMPLICATION	NO. OF CASES
Pulmonary	13
Wound infection ..	6
Miscellaneous	6
Total ...	25

cholecystitis, there was in each case a second serious complication—a calculus located outside the gall bladder. A stone was either in the common or hepatic duct, or else had eroded through the gall bladder into the intestine.

The ages of the patients were fairly well distributed, so that the mortality was not high in those above the age of sixty-five; in fact there was only one death in the 21 patients over sixty-five years of age (Fig. 5). We believe that advanced age in itself does not contraindicate surgery in acute cholecystitis.⁴

By treating the patient with acute cholecystitis as an individual surgical problem and by depend-

TABLE 3. *Causes of Death.*

AGE yr.	OPERATION	FINDINGS AT OPERATION	CAUSE OF DEATH
48	Cholecystostomy	Acute cholecystitis	Abscess of liver (calculi in hepatic duct)*
63	Cholecystostomy	Acute cholecystitis and acute pancreatitis	Peritonitis and multiple abscesses (gallstone in duodenum)*
71	(1) Cholecystostomy (2) Cholecystectomy and choledochostomy	Acute cholecystitis Chronic cholecystitis, common-duct stone and acute pancreatitis	Peritonitis and cardiac failure
59	Cholecystectomy and choledochostomy	Acute cholecystitis and common-duct stone	Pulmonary embolus*
63	Partial cholecystectomy and closure of cholecystoduodenal fistula	Subacute cholecystitis	Pulmonary embolus (gallstone in ileum)*

*Verified by autopsy.

ing on the response to hospitalization to determine the optimum time for surgery, either early or late, we have been able to reduce the mortality rate during the last five years from the former percentage of 10.7 to 3.8, a difference of 6.9 per cent, which is more than twice its standard error and therefore of statistical importance (Table 4). The gall bladder was removed in 71 cases, with a mortality rate of a little over 1 per cent, which is only a fraction higher than that for chronic cholecystitis. In 40 cases, choledochostomy was combined with cholecystectomy, with a mortality rate of 5 per cent. It is most important for the surgeon to

remember that common-duct stones occur in association with acute cholecystitis, for many clinicians believe that a stone blocking the cystic duct more or less certifies the absence of a common-duct stone.

TABLE 4. *Surgical Treatment.*

OPERATION	NO.	MORTALITY %
Cholecystectomy	71	1
Cholecystectomy and choledochostomy..	40	5
Cholecystostomy*	18	11
Cholecystostomy and choledochostomy..	2	—
Total	131	3.8

*Ten patients had subsequent operations.

We have found common-duct stones in 20 cases of acute cholecystitis, an incidence of 15 per cent, which is almost as high as that in the cases of

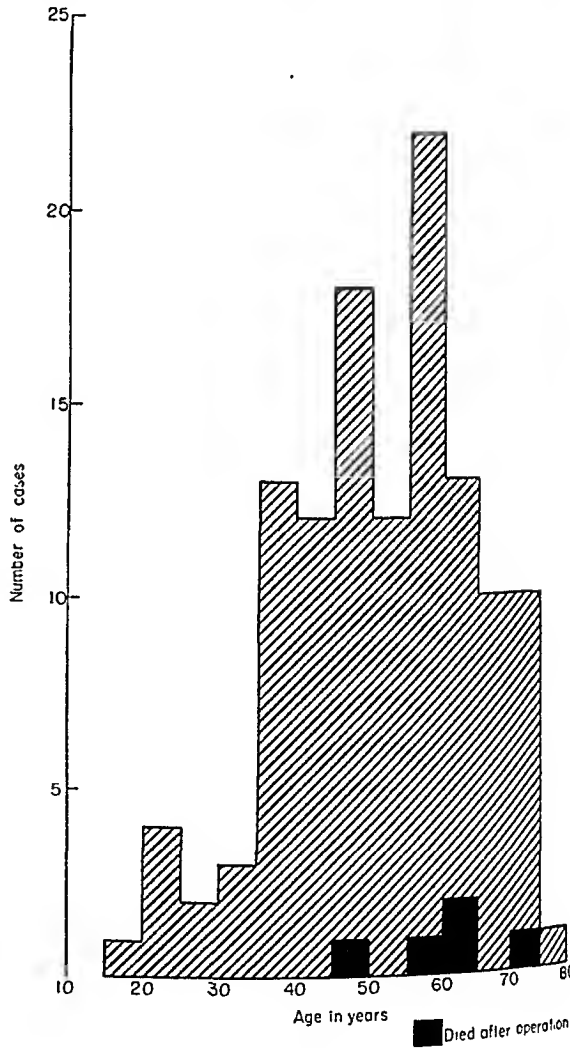


FIGURE 5. *Age Distribution.*

chronic inflammation. From the literature, it appears that the surgeons performing early operation routinely do not find so many common-duct stones.⁵ The high mortality associated with a second operation for exploring the common duct to remove the overlooked stone will in the long run, I believe, counterbalance the initial low mor-

tality The mortality rate for cholecystostomy was high (11 per cent), but this procedure was carried out in only the severest cases Cholecystostomy is a valuable method, and the surgeon should not hesitate to utilize it when he doubts the safety of cholecystectomy.⁶ Except in patients who are very poor risks, cholecystectomy follows cholecystostomy, either in the same period of hospitalization or within a few months

Improvements in the general care of surgical patients, such as attention to fluid balance, must receive due credit for reducing postoperative mortality in recent years However, individualization of the treatment of the patient with acute cholecystitis has played a considerable role in this lowered mortality and is perhaps more important than a strict adherence to a standard policy of treatment

SUMMARY

Immediate hospitalization should follow the diagnosis of acute cholecystitis

Each patient with acute cholecystitis is an individual surgical problem The optimum time for operation depends on the patient's response to preoperative treatment

A mortality rate of 38 per cent was obtained over a period of five years in the surgical treatment of 121 cases of acute cholecystitis

A common-duct stone is a frequent complication of acute cholecystitis, and occurred in 15 per cent of our cases

REFERENCES

- 1 Graham H F and Hoffer M E Acute cholecystitis: the results of operation on within forty-eight hours of the onset of symptoms *Ann Surg* 108 874 8 6 1938
- 2 Branch C D and Zollinger R Acute cholecystitis: study of conservative treatment *New Eng J Med* 214 1173 1177 1936
- 3 Graham H F Fewer deaths from gall bladder disease *Am J Surg* 34 199 1936
- 4 Quigley T B Biliary surgery in the aged: a study of one hundred consecutive cases *New Eng J Med* 221 9 974 1939
- 5 Gleason F Acute cholecystitis *Surg Gynec & Obst* 69 431-435 1939
- 6 Cutler E C and Zollinger R Surgery of the gall bladder and extra-hepatic bile ducts *Am J Surg* 47 185 260 1940

THE CAUSES OF INDIGESTION AND THEIR RECOGNITION*

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THE words "indigestion" and "dyspepsia" suggest some disturbance in the chemical processes that food materials undergo in the gastrointestinal tract That, of course, was the original explanation for the symptoms that so frequently develop in relation to the intake of food, and it is still the explanation given by most of the laity Although it is now recognized that such chemical changes are of relatively minor importance, no more satisfactory term has been devised to indicate a syndrome that includes a subjective sensation of epigastric discomfort or pain, often related to meals, anorexia, gaseous eructations, regurgitations, nausea and vomiting, and sometimes headache, palpitations and general nervousness and weakness For lack of a better term, I shall therefore refer to this group of symptoms, which is obviously related to the stomach, as "indigestion"

The justification for recognizing the syndrome is not that it constitutes a diagnosis, for after all it is no more a diagnosis than hypertension, dyspepsia or jaundice is But just as each of those terms connotes a group of clinical phenomena, ex-

plainable on the basis of a disturbed function of the body, so indigestion designates a picture of disturbed gastric physiology The dysfunction is itself a manifestation of some more fundamental disorder of the body; the identification of that disorder constitutes the diagnosis

Irrespective of the diagnosis, the clinical manifestations of indigestion are probably always immediately dependent on a disturbance of the motor function of the stomach, rarely of the secretory function Distress or pain in the epigastrium is believed to be due to an increase in the tension of the stomach walls, which in turn may be incident to spasm, especially of the cardia, pylorus or proximal duodenum, to increased tone of its general musculature, to overfilling of the organ or to variations in the normal progression of its peristaltic waves Eructations, regurgitations, nausea and vomiting, even anorexia, are also believed to be the result of a motor disturbance of some kind, at times to an actual reversal of the peristaltic waves Thus though indigestion may have many and varied causes, it apparently always in itself represents a localized motor disturbance of the stomach Secretory alterations are today believed to be important chiefly because of their effects on the motor function of the stomach

*Read before the New England Postgraduate Assembly in Cambridge Massachusetts, November 13, 1940

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In searching for the ultimate causes of indigestion one must therefore consider the mechanisms that control the motor functions of the stomach. Like other muscular structures, its walls normally possess a certain degree of tonicity or of contractility, this phenomenon being, in part, intrinsic and, in part, dependent on the innervation of the organ by the autonomic nervous system. The same autonomic nerves that supply the gastric muscles also supply other parts of the digestive tract, the liver and the gall bladder, the pancreas and the genitourinary organs. This relation undoubtedly accounts for so-called "reflex disturbances" in the stomach secondary to disease in those organs. Also, since the autonomic nervous system has a center in the hypothalamus, one can understand how certain cerebral organic lesions, even emotional disturbances, may set up alterations in the functions of the stomach. One thinks of the vomiting in massive brain lesions, of the nausea and vomiting in seasickness and migraine, of the gagging that occurs in some people on viewing a revolting scene, of the aerophagia, belching, nausea and vomiting that not infrequently develop under great emotional strain, as in the presence of a serious accident or the death of a relative. I need not pursue the illustrations, except to point out that vague digestive disturbances often originate in prolonged and less critical emotional stress, as in domestic quarrels, business upsets and undue mental fatigue.

The motor functions of the stomach may also be disturbed as a result of the local circulatory alterations that occur in cardiac decompensation or from portal obstruction. Indigestion is often the first manifestation of a failing circulation, of cirrhosis of the liver or of portal thrombosis. It may, likewise, result from toxic substances, acting locally or on the central nervous system, as in uremia, drug poisonings and certain general infections, such as typhoid fever, pneumonia and especially scarlet fever and other childhood infections.

Finally, disturbed motor function occurs as a result of local gastric lesions: gastritis, ulcer, tumors, pressure from the outside or intrinsic cicatrices. These may act directly by producing spasm of the gastric musculature or organic obstruction, interfering with either the normal entrance or exit of the gastric contents.

It is customary to speak of the gastric dysfunction due to psychic or emotional disturbance as "nervous indigestion," a gastric neurosis or functional dyspepsia; as a matter of fact, however, relatively few cases of indigestion are caused by organic disease of the stomach, and it is equally fitting to regard the indigestion of appendicitis, of gall-bladder disease or of an organic brain or

spinal-cord lesion as 'functional'. Even the indigestion of carcinoma or ulcer of the stomach is mainly the result of associated functional abnormalities of the stomach, superimposed on some locally irritating or obstructive phenomenon. In all cases, therefore, one may think of indigestion as a functional disturbance—a local motor dysfunction of the stomach resulting from faulty impulses reaching it through the nervous system, from toxins reaching it through the mouth or through the blood stream or from some locally acting factor, such as congestion, overfilling of the lumen of the organ or the presence of an irritating or mechanically obstructive lesion.

In spite of this viewpoint regarding the mechanism of indigestion and in deference to custom, we have continued, in our gastrointestinal clinic, to group under the heading of "functional gastric disturbance" or "gastric neurosis," all cases that cannot be explained as the result of an organic disease of the gastrointestinal tract or its associated organs. Our analysis (Fig. 1) is based on

	NO CASES	PER CENT	PER CENT					
			4	8	12	16	20	24
GALL-BLADDER DISEASE	787	30.9						
DUODENAL ULCER	624	24.5						
FUNCTIONAL GASTRIC DISTURBANCE	444	17.4						
FUNCTIONAL COLONIC DISTURBANCE	198	7.8						
CHRONIC GASTRITIS	123	4.8						
STOMACH ULCER	105	4.3						
STOMACH CARCINOMA	102	4.0						
DUODENITIS	99	3.9						
APPENDICITIS	60	2.4						
	2542	100						

FIGURE 1. *Incidence of the Commoner Gastrointestinal Lesions that Produce "Indigestion."*

2542 cases of indigestion, 17 per cent of which were found to be functional. It is to be remembered that in such a clinic the cases are selected; those with obvious cerebral lesions, cardiovascular or renal disease and general infections go elsewhere in the hospital. The functional group, therefore, consists largely of patients whose symptoms are nonorganic. In private practice the functional group, even on such a basis of classification, is, of course, much larger—usually over 50 per cent.

Most of the 17 per cent have resulted from psychic or emotional disturbance, from anxiety states, fears, domestic turmoil and maladjustments in general. They are sent by general practitioners, who often suspect the nature of the trouble but consider it important to eliminate organic disease. Surprisingly, the mere demonstration of the absence of such disease alone cures many patients. With others, when the facts can be secured and the situation rationalized, the symptoms disappear.

With still others, help must be sought from mental hygienists, but this number is small. One wonders if even psychiatrists realize how many of these cases are satisfactorily handled by the resourceful and intelligent family physician or internist.

I shall now consider those patients who develop the syndrome on the basis of organic disease in the gastrointestinal tract or its associated organs.

Figure 1 shows that the largest number, 31 per cent, of the patients were proved eventually to have gall bladder disease, with or without stone. This observation is of great importance because it suggests that the gall bladder should always be suspected in every case of indigestion and eliminated before other causes are seriously considered. A probable diagnosis of cholelithiasis can often be made on the basis of a characteristic history of biliary colic, especially when associated with local tenderness or jaundice, but often, even in the presence of stone, and commonly, when no stone is present, the symptoms are similar to those of any other type of gastric dysfunction, consisting chiefly of vague discomfort, eructations, regurgitations, sometimes nausea and even vomiting. In such cases one should not eliminate the possibility of gall bladder disease without obtaining both a biliary-drainage test and a cholecystogram. Sometimes one and sometimes the other may be negative, even in the presence of stone, but rarely will both tests give a negative result. Our experience with proved cases shows that by the use of one or the other test some abnormality may be demonstrated in more than 95 per cent and in an almost equal percentage of the cases without stones.

Duodenal ulcer is the next most frequent cause of indigestion—24 per cent in our series. Its diagnosis or elimination on the basis of the patient's history is more accurately determined, but even in dealing with ulcer one should never trust the history alone, no matter how clearly the pain is related to the intake of food, how clear-cut its relief by alkalies or what the general course of the disease. An exactly similar picture may be present in the absence of ulcer. Gastric analysis is of relatively little help, although the acid figures in duodenal ulcer are usually high. X-ray study is of maximal importance. The accuracy of the roentgen ray investigation in the diagnosis of ulcer, in good hands, is today probably 95 per cent, and in all questionable cases it should be employed.

The functional disturbances of the stomach come next in frequency, after gall-bladder disease and duodenal ulcer, and have been considered.

The group to which I refer in Figure 1 as "functional colonic disturbance" requires some explanation. This applies to functional disturbances of

the stomach (indigestion) caused by some abnormality primary in the terminal ileum or colon; the latter may be organic or functional. It thus includes indigestion dependent on constipation, irritable colon, colonic diarrheas as well as terminal ileitis, diverticulitis and tumors of the colon. Perhaps I should also include cases of appendicitis, which, in spite of their general frequency, are rare in a medical clinic. In any event, all these disturbances that lead to stasis in the colon and terminal ileum, whether by spasm or organic obstruction, often produce a delay in gastric evacuation, with eructations, regurgitations, nausea and frequently vomiting. Intubation studies have clearly shown the influence of the spastic terminal ileum on gastric motility. This disturbance in the motility of the stomach may be reflex from below through the autonomic nervous system, or it may result from some more inherent nervous or muscular mechanism. At the moment I am concerned with the mere fact of its occurrence and with its contribution to the etiology of indigestion.

Bowel disturbances must not, therefore be forgotten in searching for the cause of indigestion. They are to be found by a careful consideration of the history of the case, by physical examination, especially by digital examination of the rectum, by proctoscopy and by the barium enema. Many cases have gone unexplained for a long time because of failure to remember this possibility and to employ the proper diagnostic procedures.

Each of the organic diseases of the stomach itself—ulcer, carcinoma and gastritis—occurred in about 4 per cent of our total group. The diagnosis of gastric ulcer depends on the same clinical and laboratory data as that of duodenal ulcer. Gastric cancer, however, deserves special mention. It may give rise to only the vaguest symptoms, or to none, until all hope of cure has passed. Its early recognition, therefore, is so important that no case of indigestion—no matter how trivial and especially if it occurs in a person of middle age or beyond in whom the symptoms have developed without obvious cause—should fail to have adequate study. This should include gastric analysis, roentgenologic investigation and sometimes gastroscopy. The gastric analysis alone should never be relied on, since in our experience 20 per cent of the cases showed a normal or high free acid content. The roentgen study, however, is of great importance and usually reveals the nature of the lesion, or at least indicates the need for further close observation. In the uncertain cases, the gastroscope may be of the greatest help, this type constituting one of the chief indications for its use.

Chronic gastritis is of equal frequency with ulcer and carcinoma of the stomach. Gastroscoy is definitely indicated when gall-bladder disease, ulcer and cancer have been eliminated and no probable explanation for the indigestion exists, even when the roentgen-ray study is negative. The time has passed for diagnosing gastritis on the basis of an alcoholic history, achlorhydria and mucus in the gastric contents. None of these may be present, and yet a well-developed atrophic or hypertrophic gastritis, curable by intelligent therapy, may be demonstrable. Whether or not atrophic gastritis is the cause of carcinoma of the stomach or pernicious anemia, it frequently precedes the development of those diseases; its recognition is important, therefore, if only to keep the subject under observation for the development of the signs of one of those more serious diseases.

I have placed little emphasis on the type of indigestion, which I believe has been overstressed in the past and is overstressed in modern textbooks. One hears too much about the gaseous eructations and night pains of gall-bladder disease, the relation of food to pain in ulcer, the boring pain of cancer of the stomach. These are helpful items of history, but often they are misleading and should not be allowed to determine the final working diagnosis in any case. The ob-

servations on physical examinations are rarely of significance in this type of disease; when positive, however, they may be of great assistance. Mistakes on the basis of the history and the physical examination alone are too costly; roentgen-ray investigation, biliary drainage, proctoscopic and gastroscoy studies, in spite of their trouble and expense, are timesaving and cheaper in the end for the patient and the doctor. The results must, however, be interpreted by the physician in correlation with his other clinical observations.

SUMMARY

I have defined "indigestion" as a syndrome resulting from motor dysfunctions of the stomach, and have referred to its association not only with diseases of the stomach and intestines and their appendages, but also with various circulatory, toxic, psychic and emotional disturbances. I have also outlined the relative incidence of its commoner causes as encountered in the gastrointestinal clinic of a general hospital, and have emphasized the importance of a complete investigation of every patient with the syndrome, employing, in addition to a careful history and a thorough physical examination, all the available special diagnostic procedures.

318 University Hospital.

AN UNUSUAL CASE OF SUBDURAL HEMATOMA*

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CASE REPORT

IT HAS been an observation of increasing frequency that hematomas of the cerebral group, particularly subdural hematomas, may assume the characteristics of almost any cerebral lesion. Much has been written concerning post mortem findings in such cases, and it is indeed no rarity for the neurosurgeon to operate on a supposed brain tumor, only to discover a subdural hematoma. Fur-

A 38 year old man was admitted to the Worcester City Hospital on June 3, 1933, with the complaint of headaches and a swelling of the right eye of 5 days duration. A ray examination confirmed the impression of severe pansinusitis. Shortly after admission, a turbinectomy was performed, together with drainage of an orbital abscess. After a hospital stay of 47 days, the patient was finally discharged improved with a diagnosis of pansinusitis.



FIGURE 1 Encephalogram

The postero anterior view reveals an over the left cortex with the cortical markings present. There is little evidence of an over the right cortical surface. There is no shift of ventricular system from the mid line.

thermore, it is now a well-established fact that operative exploration is the one method of ruling out the possibility of subdural hematoma in suspected cases.

In a series of 57 cases of cerebral hematoma, analysis has shown that in the great majority the preoperative diagnosis has offered no unusual difficulty. There was, however, one exceptional case in this group, and owing to its decidedly unusual character, it has been considered worth while to present it in the form of a report.

The second admission occurred on August 28, 1933. During the interval of 2 months between admissions, the former symptoms returned. The patient complained of severe headaches and a low grade afternoon fever. For the first time he also noted cloudiness of vision in the right eye. Routine examination showed an edematous and slightly reddened area about the right orbit, with tenderness to palpation. There was some exophthalmos. There was blurring of the right disk. Lumbar puncture revealed a pressure of 280 mm. of water. Subsequently, operation was performed and the patient was found to have, in addition to the right frontal sinusitis, a right orbital abscess and an abscess involving the right frontal lobe of the brain. He was finally discharged free of symptoms on the 76th hospital day.

The patient was admitted on February 19, 1940 for the

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FIGURE 2. *Encephalogram.*

The left anterolateral view, taken with forehead up, reveals evidence of air over the left cortex.



FIGURE 3. *Encephalogram.*

The right lateral view, taken postoperatively, reveals the extent of the field exposed at operation.

third time. He stated that during the interval of 7 years he had been perfectly well until approximately 2 weeks previous to admission. The diet had been adequate, and alcohol had been used sparingly. There had been no history of trauma of any kind. The present illness was ushered in by a head cold associated with headache. On

with each spell. Physical examination showed a slightly dilated right pupil and beginning edema of the right optic disk. The peripheral reflexes of the left side were increased over those of the right. On the left there were positive Babinski and Hoffmann reactions. There was some left-sided ataxia. Lumbar puncture was performed, and the

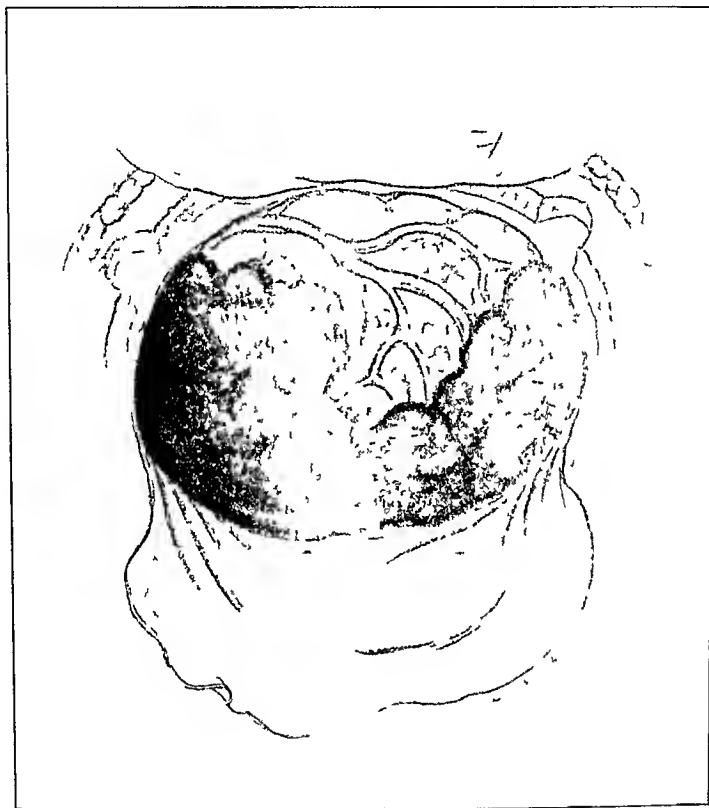


FIGURE 4

This drawing shows the operative field through a right temporoparietal bone flap, with the subdural hematoma in situ. The lower portion of the clot has been removed exposing the cerebral cortex.

the day before admission, except for these complaints the patient appeared well, soon after retiring that evening however, he became very restless, and it was noted that his face twitched slightly on the left side. Gradually, he became stuporous and was sent to the hospital. In the emergency ward he experienced 3 successive violent Jacksonian seizures involving the left side. These attacks were characterized by beginning twitching of the left side of the face, rapidly spreading into the left arm and then into the left leg. The seizures tended to subside in the reverse order of progression. Cyanosis and dyspnea were marked

initial pressure was found to be 210 mm. The total protein content was 22 mg per 100 cc, with clear fluid. A ray examination of the skull revealed nothing unusual except the old operative defect of the right frontal sinus. Following the lumbar puncture, moderate limitation of fluids and medication, the attacks became less frequent and severe during the next few days. However, they recurred suddenly and approached the condition of status epilepticus. The spinal fluid pressure had risen to 260 mm, and the total protein to 40 mg. The diagnoses varied considerably, including brain tumor, recurring brain abscess and adhesive

arachnoiditis, with a question of cortical scarring. An air injection was performed to substantiate or to rule out an expanding lesion. The air films revealed no shift of the ventricular system. In the anteroposterior view, cortical markings were present on the left side, but on the right no air was visualized in the subarachnoid space. In other words, the x-ray films supported the diagnosis of chronic adhesive arachnoiditis, with cortical scarring involving the right side of the brain (Figs. 1 and 2).

A right-sided bone flap was turned down, and directly beneath the dura a large localized clot, approximately 2 cm. thick, was exposed (Fig. 3). The brain cortex directly underneath this clot was flattened and depressed. The arachnoid, when exposed after removal of the clot, was slightly thickened but not adherent, and did not have the gross appearance of chronic adhesive arachnoiditis (Fig. 4). Furthermore, no evidence of cortical scarring was noted on gross examination. The diagnosis was subdural hematoma.

The postoperative course was uneventful. The condition of status epilepticus was completely relieved, and the patient experienced no further seizures. He was finally discharged on the 17th postoperative day, without complications. Since discharge, the patient has been followed at regular intervals. The abnormal neurologic findings gradually disappeared. He has been working at his old job in a machine shop and has experienced no ill effects. His general condition at the present time is described in his own words as "never felt better."

This case raises several interesting points. The first is whether or not the underlying brain involvement due to abscess formation resulted in any delayed contributing influence in the development

of this subdural hematoma. It seems logical to assume that there was no relation. The interval of seven years of absolute freedom of symptoms is against any association between the two conditions. The second point revolves about the fact that, both preoperatively and postoperatively, the patient denied any history of injury. Therefore, the question is again raised whether in cases of this sort blows of such relative insignificance that they are ignored or forgotten are sufficient to result in subdural bleeding. Patients suffering from deficiency diseases and alcoholism appear to be susceptible to the formation of subdural hematomas, and in many the evidence of trauma may be totally lacking. In the case presented above there was no evidence of deficiency or alcoholism; hence, insignificant trauma, which is often underestimated as an etiologic factor, seems to have been a reasonable causative agent.

SUMMARY

From a series of 57 cases of cerebral hematoma, an unusual case of subdural hematoma with questionable etiology has been presented. The possible relation between brain abscess and such late complications has been mentioned, and the question of insignificant trauma as an etiologic factor has been raised.

27 Elm Street

A PHARMACOLOGIC AND CLINICAL RE-EVALUATION OF AMPHETAMINE (BENZEDRINE) SULFATE*

WILLIAM M. CAMERON, M.D.,[†] AND J. KASANIN, M.D.[‡]

SAN FRANCISCO

AMPHETAMINE (Benzedrine) has had a wide clinical application in recent years, but empirical enthusiasms have outraced and often ignored the experimental studies that might have tempered them. This extensive use of amphetamine has not generally been based on a commensurate pharmacologic knowledge of the drug and of the group of amines to which it is related. Consequently, many erroneous notions regarding the locus and mode of action of amphetamine are current. This is unfortunate because it tends to spread inaccurate conceptions of the role of the autonomic nervous system in the physiopathology of disease processes.

Amphetamine is often called "sympathomimetic"; this is a misconception. The term "sympathomimetic" is a descriptive one meaning the mimicking of the effects of the sympathetic branch of the autonomic nervous system, "without," as Barger and Dale¹ have said, "involving any theoretical preconception as to the meaning of that relation [of action to sympathetic innervation] or the precise mechanism of action." Amphetamine mimics these effects to some degree, but there are important qualitative as well as quantitative differences between the actions of amphetamine and those of a truly sympathomimetic drug, such as epinephrine. Epinephrine reproduces all the effects of direct sympathetic stimulation because it activates the specific sympathetic effector mechanisms, and for this reason it is called "sympathicotropic." This elucidation of a more "precise

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mechanism of action" is a development that has begun since the work of Barger and Dale, and is one that still remains incomplete. Amphetamine, however, is not sympathicotropic, and appears to act through direct stimulation of smooth muscle and in other ways than through specific sympathetic channels. Similar misconceptions arose during the early experimental studies with tyramine¹ and ephedrine.² A study of amphetamine should include a survey of the pharmacology of related sympathomimetic amines. These drugs may differ only slightly in their molecular configuration, and may nevertheless show considerable individuality in their actions; conversely, certain structural configurations determine important generic characteristics. Among these are certain toxic effects that must be watched for in the use of amphetamine, since all such effects have not yet been ruled out experimentally.

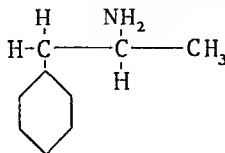
The stimulant effect of amphetamine on the central nervous system and its effective administration by mouth have probably promoted experimentation with the drug for other purposes. Yet its various peripheral actions appear to present no advantage over those of ephedrine and related compounds already in use. Indeed, when pressor, vasoconstrictor and other actions from amphetamine are sought, the central stimulant action confronts one as a serious disadvantage. Furthermore, it is a regrettable trend toward categorical thinking that forces some workers to class amphetamine as a sympathetic stimulant, and to equate it with epinephrine. Nor is its central stimulant action any evidence for general sympathetic stimulation, since the most typically sympathicotropic drugs do not possess this property.⁴

This paper presents a summary of the pharmacodynamics of amphetamine and related compounds, and considers chiefly the results of experiments on animals, since proper analyses can hardly be made with clinical material. The objectives of this survey are to establish some general correlations between molecular structure and action, as an aid in identifying the relation of amphetamine to the sympathomimetic amines; to aid in establishing more definite criteria of sympathicotropic action, and to stimulate a more critical attitude toward claims in this direction.

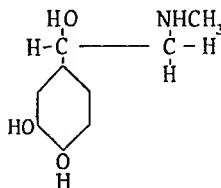
PHARMACODYNAMICS*

Amphetamine or phenylisopropylamine (dl-alpha phenyl beta amino propylamine) is usually employed in the form of the racemic sulfate, except as an inhalant, when the carbonate is used. It induces general systemic effects when taken by

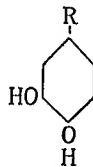
mouth, inhalation or injection in doses of 25 to 10 mg. Its structural formula is as follows.



Epinephrine, the most potent of the sympathomimetic amines, is a typical sympathicotropic drug; its structural formula is as follows:



The structure of epinephrine meets the original criteria for optimal sympathomimetic activity postulated by Barger and Dale¹ and confirmed by many other workers.⁵⁻¹⁰ It should be noted that epinephrine contains the catechol nucleus



It is evident, however, that amphetamine departs from this optimal molecular configuration, and it will become clear that it does so at a sacrifice of its sympathomimetic effects, regardless of what other actions it may have acquired.

This assumed relation between structures and function may be checked by the classic experiments with ergotamine and cocaine,⁶ Tyramine,¹¹⁻¹³ ephedrine,^{6, 14-17} phenylethanolamine^{6, 18, 19} and amphetamine,^{6, 20-22} all closely related structurally, fail to give to these tests the responses typical of sympathicotropic drugs. Functionally, then, they are only pseudosympathomimetic, and do not resemble epinephrine in their mode of action. Since the phenyl group of amines differs from epinephrine in both structure and function, it is of considerable significance that the addition of hydroxyl

*At the request of the Editors this section is presented in a summary form on account of its specialized nature.

groups to the phenyl ring of amphetamine,^{22, 24} ephedrine^{9, 10} and phenylethylamine^{22, 24, 25} has in each case resulted in a sympathomimetic action more closely resembling that of epinephrine than was characteristic of the original drug. We may therefore conclude that the presence of the catechol nucleus, or possibly merely the meta OH-group, is necessary for sympathicotropic action. Variations in the side chain are of lesser significance. A longer side chain sacrifices intensity of action for greater duration, but carries greater toxicity. In the following summary of the effects of amphetamine on the various organ systems it would be well to bear in mind the comparison of these with the effects cited for other amines. If amphetamine seems neither more potent nor less toxic, it would be wise to advocate the use of one of the other amines.

Pressor Effects

Amphetamine has a pressor action in animals, although the effects are rather irregular and do not correspond closely to the dosage used.²⁰ Its ratio of activity to epinephrine is approximately that of 1:425,⁷ and it is consequently classed as a weak pressor agent. It is exceeded in activity by ephedrine, tyramine and many other amines. Tachyphylaxis is probably more marked than with ephedrine, and in some cases even a second injection was ineffective or caused a fall of arterial pressure.⁷ Its duration of effect is relatively prolonged.

The principal virtue of amphetamine in clinical use lies in its activity when given by mouth, in contrast to most of the other amines.^{26, 27} Propadrine (phenylpropanolamine), however, might be worth trying when there are indications for the oral administration of a pressor drug. It is probably more active than either ephedrine or amphetamine,⁷ is less toxic than ephedrine,²⁸ and because of its beta OH-group, is estimated to be one third as toxic as amphetamine.²⁷

Cardiac Effects

Thienes and his co-workers²⁰ found that the heart in atropinized animals responded to amphetamine with a moderate increase in rate. There was no significant change in stroke volume. Chen and Schmidt,³ Chen and Meek,^{14, 15} and others^{13, 29} have cited the depressant effect of ephedrine on the cardiac musculature. The possibility that amphetamine possesses similar undesirable effects must receive consideration. Chen and Meek¹⁴ made electrocardiographic studies of dogs and rabbits that received large doses of ephedrine and found depression of the conduction system and various degrees of heart block. This was followed by ventricular fibrillation in some cases. It

is significant that large doses of tyramine had no such effects. Phenylethanolamine is also relatively nontoxic to the heart.^{18, 19, 22} Since a short side chain and the presence of an OH-group lessen toxicity,^{22, 27, 28} a longer side chain, lacking an OH-group, has greater toxicity. Thus, the molecular structure of amphetamine conforms to the criteria for relatively high toxicity. Many workers^{8, 22, 30, 31} have demonstrated that amphetamine and other phenyl amines are of little value in experimental circulatory collapse, and that the catechol derivatives are most effective. Clinically, Waud³² has demonstrated cardiac depression in healthy young subjects following extremely large doses of amphetamine. Other workers have reported paradoxical falls in blood pressure during ordinary clinical use of the drug,³³⁻³⁵ but few alarming cardiovascular effects have been cited.³⁵

Bronchial Action

Clinicians have long been interested in finding an antiasthmatic substitute for ephedrine that could be effectively administered by mouth and would dilate the bronchi as well as ephedrine without the undesirable cerebral stimulation. Since amphetamine fails in the former condition, and exceeds ephedrine in the latter³⁷ it cannot be seriously considered as a bronchial dilator. Epinephrine and the other catechol derivatives far exceed amphetamine, ephedrine, tyramine and their structurally related amines in bronchodilator action.^{8, 38-42}

Effects on Smooth Muscle

Both epinephrine and ephedrine inhibit intestinal motility. Chen, Wu and Henriksen²⁸ reported that the majority of twenty-four phenylring derivatives, tested on isolated rabbit intestine, did likewise. Experiments with amphetamine have been less clear cut; Thienes and co-workers²⁰ have been unable to arrive at a formulation of the mode of action of amphetamine, although they have shown in nerve-degeneration experiments on the cat intestine that the modes of operation of amphetamine and ephedrine differ qualitatively from that of epinephrine.²¹ Alles and Piness²³ obtained increased tonus with minimal concentrations of amphetamine, and relaxation with greater concentrations on the isolated rabbit ileum.

Myerson and Ritvo¹³ believe that amphetamine is of decided value in relaxing gastrointestinal spasm of intrinsic or reflex origin, and that this relaxation occurs without a concomitant delay in gastric emptying time. Rosenberg, Arens, Marcus and Necheles,⁴⁴ however, obtained inconclusive clinical results with amphetamine, and in experimental studies found that the drug often induced

gastrointestinal spasm rather than relaxation. The conclusions of Beyer and Meek⁴⁵ also differed from those of Myerson and Ritvo; they found that amphetamine caused a delay in the final emptying time of the stomach, but that this effect was feeble as compared with that of atropine or ephedrine.

Mydriatic Action

Mydriasis may be produced by epinephrine, ephedrine, tyramine, amphetamine and many other amines.^{3,13,19,46} There appears to be nothing unique in the clinical effects of amphetamine when used as a mydriatic, but denervation experiments clearly demonstrate that it is not sympathicotropic in action.^{19,21} Caution should therefore be observed in drawing conclusions concerning physiologic pathology on a basis of its clinical effects.

Effects on Blood Sugar

Among the aromatic amines only epinephrine and related catechol derivatives possess the capacity to induce a rise in the blood sugar level in nontoxic doses. Schaumann² has shown that the introduction of two OH groups into the benzene ring—giving ephedrine a catechol nucleus—is enough to bestow the capacity to raise the blood sugar. Conversely, this highly specific sympathicotropic effect is lacking in drugs that have deviated as far as amphetamine from the molecular structure of epinephrine.^{23,47,48}

Tachyphylaxis and Toxicity

Tachyphylaxis is that phenomenon in which a drug elicits progressively weaker responses in a succession of injections, although there is no apparent general physiologic decline to explain the fact. Pressor responses may even be reversed to depressor ones, and this may occur within three or four injections. Chen and Schmidt³ described this phenomenon in their early work with ephedrine. It is common to most ephedrine derivatives, is present with phenylethylamine,²² and is marked with amphetamine.⁷ Tachyphylaxis does not occur with epinephrine and related catechol derivatives or with tyramine and phenylethanolamine.

It is evident that there is a close relation of structure to this important feature of drug activity. Amines that have long side chains and lack the OH group, like amphetamine, show tachyphylaxis in its most marked degree. These structural features are also characteristic of the more toxic amines.

Chen and Schmidt³ assumed that tachyphylaxis was caused by the cardiodepressant action of ephedrine, although the heart seemed quite responsive to subsequent injections of epinephrine. But Tainter,⁴⁹ using Gibbs's artificial heart in cats,

demonstrated typical tachyphylaxis after ephedrine, proving that it was not entirely dependent on an altered response of the heart.

The most prevalent hypothesis seeking to explain the relation of tachyphylaxis to the structure of compounds like amphetamine and ephedrine is that these more stable compounds are not readily oxidized by the organism, and that consequently local fatigue occurs at their locus of operation, since they remain in the tissues until excreted by the kidneys. Since epinephrine operates on a different locus, it is still effective when the organism is fatigued by the action of these drugs. This failure to be quickly metabolized possibly explains their effectiveness when taken by mouth^{26,27} and their generally more toxic nature, and is compatible with the more prolonged action of drugs like amphetamine.

Toxicity is best stated in terms of "therapeutic index" or ratio of toxic to therapeutic dose. The present study has shown that this index diminishes with the increasing length of the side chain and with the depletion of the amine of its OH groups. The substitution of a propylamino group for the methylimino group in ephedrine, for example, results in the drug's manifesting only depressive and toxic effects.²³ It is evident from a consideration of its structure that amphetamine must be suspected of considerable toxic effect and a relatively low therapeutic index. The experimental studies cited have supported this conclusion. The use of repeated doses of amphetamine may lead to cumulative toxic effects, since the drug is not readily oxidized and is only slowly excreted through the kidneys.⁵⁰

In many of the present applications of amphetamine, the central stimulation is a highly undesirable side action. In this respect the use of the drug for its feeble gastrointestinal effects is illogical, since its central stimulant action surpasses that of more effective drugs. It is not yet possible to say that in clinical doses amphetamine has no injurious effect on the heart. The collapse and death of a college student, recently reported by Smith,⁵¹ suggest that accumulation may be a significant factor even when small doses are taken. The majority of cases of severe toxic reactions have occurred following no more than the therapeutic dose, and it is apparent that these patients were unusually sensitive to the drug. Nevertheless, since the widespread clinical use of amphetamine cannot be justified—except in certain conditions mentioned below—by the pharmacologic findings, it is unwise to risk even a remote chance of a grave toxic reaction.

Critique of Clinical Applications

A complete review of the present status of amphetamine therapy will not be presented, since this has been done recently by Davidoff and Reifenshtein^{53, 52} and others.⁵³⁻⁵⁵ There is little doubt that the central effects of the drug have been very beneficial in narcolepsy,^{37, 56, 57} in postencephalitic parkinsonism,^{58, 59-60} and in alcoholic, barbiturate and some other intoxications.^{52, 61} But its use in the psychotic states has not on the whole been encouraging.^{34, 62-65} There has been little modification of the essential features of the schizophrenic or depressive reactions in cases treated with amphetamine. Occasionally patients appear more talkative and accessible, but these minor responses are just about balanced by panicky reactions and suicidal attempts in other patients. Wilbur, MacLean and Allen⁵³ obtained considerable but passing improvement in patients with so-called "chronic exhaustion" or mild depressive states. It is questionable whether one can consider this experience a specific response to amphetamine in any way analogous to the well-maintained responses in the patients with medical disorders.^{37, 57} Non-specific factors are difficult to control. Bahnsen, Jacobsen and Thesleff,⁶⁶ for example, found that of 100 normal adults comprising a control group in experiments with amphetamine, 13 per cent had lessened fatigue following the use of starch tablets.

Guttman and Sargent⁶⁴ point out that amphetamine tends to exaggerate the innate personality trend, and may exaggerate hypochondriacal or obsessive reactions. They, and others,⁵³ have avoided its use in anxiety states, which tend to be heightened by the drug. Anxiety is a common component of many neuroses. One should consequently expect superficially satisfactory responses—decreased awareness of fatigue, talkativeness and mild hypomanic euphoria—to overlay a concomitant state of increased tension, potentially capable of involuntary and unintegrated expression. Panic states do occur, of course, and constitute an eventuality demanding constant vigilance in the use of amphetamine in the major reaction types. We are inclined to regard many of the disagreeable symptoms—palpitation, sweating and tremor—elicited by small doses in some normal subjects as manifestations of central rather than peripheral action, a central action that, in effect, mobilizes latent anxiety. Bahnsen et al.⁶⁶ also ascribed several of the peripheral effects of amphetamine to stimulation of the central nervous system.

Because negative findings are less apt to be reported than positive ones, we submit the following report. One of us (J. K.) has employed amphetamine* rather extensively in the psychiatric clinics

of the Michael Reese Hospital in Chicago and of the Mount Zion Hospital in San Francisco, and can only conclude that the drug appeared to be of questionable value in the treatment of patients with psychogenic disorders. The conspicuous absence of either subjective or objective responses to doses of 10 to 20 mg. was quite common among these patients. Seventy-five patients, 36 men and 39 women, were so treated. Most of them were referred to the psychiatric clinics from other clinics of these hospitals, where they were complaining of nervousness, and where the functional nature of their symptoms became apparent to the examining physicians. Ten patients suffered from varying degrees of depression, whereas 65 showed symptoms of tension, insomnia, various somatic complaints with varying degree of anxiety, a feeling of insecurity, loss of faith in themselves, premonitions of dangers and death, and marked dependence on their physicians.

In the cases of depression, 3 patients showed a slight transitory improvement, but even then it was not possible to rule out other factors that might have been equally responsible for the improvement. The 3 patients who improved stated that amphetamine was responsible for giving them some "pep" to get up in the morning when they would otherwise prefer to stay in bed. It must be remembered, however, that together with the command to take the drug, the patients were told that they would feel very much better. Five patients reported no improvement, and 2 became definitely worse, complaining of feeling unnatural, giddy and "funny in the head," and getting more discouraged.

In the 65 patients suffering from neuroses, the suggestion that the drug would be very effective in ameliorating symptoms was used in 30, but only 9 stated that they felt better. Here one met with most paradoxical observations: 2 patients said that after taking amphetamine at night (by mistake) they slept very much better, and they asked that the drug be substituted for phenobarbital. Three patients said that they felt better and had more ambition than previously, but this lasted only a few weeks, after which they again became quite neurotic and complained of their previous symptoms. Four patients left the clinic, stating that they felt better, and did not respond to a follow-up letter. In the 35 cases in which the drug was given and no suggestion in any form was used, the patients reported no change. These patients were in the clinic for several months, were more or less stationary in their symptoms, and showed no response to various sedatives. It is quite possible that new patients who are given amphetamine at their first visit to the psychiatrist appear to re-

*Supplied through the courtesy of Smith, Kline and French Laboratories, Philadelphia.

act more favorably to the drug, but one must discount the effect of psychotherapy and not confuse it with the specific effect of the drug.

In general, in the light of our critical observations, there seemed to be no special indication for the use of amphetamine in either psycho-neuroses or depressions. This was in marked contrast with the 2 cases of narcolepsy, in which a very dramatic improvement was similar to that reported by Prinzmetal³⁷ and Ulrich.⁵⁸ Dr. George S. Johnson,⁶⁷ director of the Psychiatric Department of Stanford University Hospitals, has informed us that in his clinic the experience with amphetamine was similar to our own.

SUMMARY

The molecular configuration of amphetamine (Benzedrine) places it in the group of phenyl amines, another member of which is ephedrine. None of the phenyl amines are truly sympathomimetic in their effects.

Amphetamine is not sympathicotropic in its mode and locus of operation, and consequently should not be equated with epinephrine.

Amphetamine is relatively feeble in potency in comparison with other aromatic amines, such as epinephrine, arterenol and tyramine.

It is clearly established that increased length of the side chain and the absence of OH-groups are associated with increased toxicity. By these criteria amphetamine must be suspected of relatively high toxicity, which can be ruled out only by further pharmacologic experimentation.

Because the toxicity of amphetamine has not been sufficiently determined and its action is relatively feeble, it seems preferable to employ other amines for peripheral effects on the cardiovascular, gastrointestinal and other systems.

Clinically, amphetamine is valuable in certain diseases of the central nervous system, such as narcolepsy and postencephalitic parkinsonism, and in certain intoxications. The administration of the drug in neuroses, depressions and schizophrenia seems of doubtful value, and may occasionally be harmful.

Favorable results reported in such heterogeneous states as orthostatic hypotension, chronic alcoholism, obesity and schizophrenia do not speak for specificity of action, but indicate rather that other variables (present in every therapeutic situation) may have contributed to the ultimate improvement of the patients.

REFERENCES

- Barger, G. and Dale, H. H. Chemical structure and sympathomimetic action of amine. *J. Physiol.* 41:19 59 1910
- Dale, H. H. and Dixon, W. E. The action of pressor amines produced by putrefaction. *J. Physiol.* 39:25 44, 1909
- Chen, K. K. and Schmidt, C. P. The action of ephedrine, the active principle of the Chinese drug Ma Huang. *J. Pharmacol. & Exper. Therap.* 24:339 357, 1924
- Tainter, M. L., Whitsell, L. J. and Dille, J. M. The analeptic potency of sympathomimetic amines. *J. Pharmacol. & Exper. Therap.* 67:56-70, 1933
- Greer, C. M., Pinkston, J. O., Baxter, J. H., Jr. and Brannon, E. S. Nor epinephrine [B (3,4 dihydroxyphenyl) β hydroxyethylamine] as a possible mediator in the sympathetic division of the autonomic nervous system. *J. Pharmacol. & Exper. Therap.* 62:127 127, 1938
- Tainter, M. L. Comparative effects of ephedrine and epinephrine on blood pressure, pulse and respiration, with reference to their alteration by cocaine. *J. Pharmacol. & Exper. Therap.* 36:569 594 1929
- Idem. Comparative actions of sympathomimetic compounds (phenyl and substituted phenyl derivatives non phenylic ring compounds and aliphatic amines. *Arch. internat. de pharmacodyn. et de therap.* 46:192 232, 1933
- Cameron, M. M. and Tainter, M. L. Comparative actions of sympathomimetic compounds bronchodilator actions in bronchial spasm induced by histamine. *J. Pharmacol. & Exper. Therap.* 57:152 169, 1936
- Schlaumann, O. Ueber Oxyephedrine. Ein Beitrag zum Problem Konstitution und Wirkung. *Arch. f. exper. Path. u. Pharmacol.* 157:114, 1930
- Idem. Ueber Oxy Ephedrine. *Arch. f. exper. Path. u. Pharmacol.* 160:127 176, 1931
- Tainter, M. L. and Shoemaker, H. A. A striking cocaine tyramine antagonism. *Proc. Soc. Exper. Biol. & Med.* 23:157, 1925
- Tainter, M. L. and Chang, D. K. The antagonism of the pressor action of tyramine by cocaine. *J. Pharmacol. & Exper. Therap.* 30:193 207, 1927
- Butt, J. H. and Tainter, M. L. An analysis of the effect of cocaine on the actions of adrenalin and tyramine. *J. Physiol.* 71:169 193, 1931
- Chen, K. K. and Meek, W. J. Further studies of the effect of ephedrine on the circulation. *J. Pharmacol. & Exper. Therap.* 28:31 57 1926
- Chen, K. K. and Meek, W. J. A comparative study of ephedrine, tyramine and epinephrine with special reference to the circulation. *J. Pharmacol. & Exper. Therap.* 28:59 76 1926
- De Eds, F. Antagonism of the pressor action of ephedrine by cocaine. *Proc. Soc. Exper. Biol. & Med.* 24:551 1927
- De Eds, F. and Butt, E. M. Further evidences of the non sympathomimetic action of ephedrine. *Proc. Soc. Exper. Biol. & Med.* 24:800-802 1927
- Alles, G. A. The comparative physiological action of phenylethanol amine. *J. Pharmacol. & Exper. Therap.* 32:121 133 1927
- Tainter, M. L. Pharmacological actions of phenylethanolamine. *J. Pharmacol. & Exper. Therap.* 36:29 54 1929
- Detrick, L. E., Midkinn, R., Modern, F. S. and Thienes, C. H. On the pharmacology of phenylisopropylamine (benzedrine). *J. Pharmacol. & Exper. Therap.* 60:56 68 1937
- Drake, M. E., Renshaw, R. F. J., Modern, F. S. and Thienes, C. H. The smooth muscle actions of epinephrine substitutes. VII. Responses of denervated smooth muscle of the iris and intestine to epinephrine, ephedrine, amphetamine (benzedrine) and cocaine. *J. Pharmacol. & Exper. Therap.* 60:221 259 1939
- Alles, G. A. The comparative physiological actions of di β phenylisopropylamines. I. Pressor effect and toxicity. *J. Pharmacol. & Exper. Therap.* 47:339 354, 1933
- Alles, G. A. and Pines, G. Comparative actions of optically isomeric phenylisopropylamines. *Am. J. Physiol.* 126:420 1939
- Alles, G. A. and Prinzmetal, M. Comparative physiological actions of di β phenylisopropylamines. II. Bronchial effect. *J. Pharmacol. & Exper. Therap.* 48:161 174 1933
- Tainter, M. L. Comparative actions of sympathomimetic compounds and the influence of cocaine and certain related compounds upon the actions of a group of sympathomimetic amines. *Quart. J. Pharm. & Pharmacol.* 3:584 593, 1930
- Pines, G., Miller, H. and Alles, G. A. Clinical observations on phenylisopropylamine sulfate. *J. A. M. A.* 94:790 1930
- Hartung, W. H. and Munch, C. Amino alcohol the preparation and pharmacodynamic activity of a isomeric phenylisopropylamines. *Am. Chem. Soc.* 53:1875 1878, 1931
- Chen, K. K., Wu, C. K. and Henniken, E. Relationship between the pharmacological action and the chemical constitution and configuration of the optical isomers of ephedrine and related compounds. *J. Pharmacol. & Exper. Therap.* 36:363 400 1929
- Hildebrandt, H. and Muge, Z. Zur Katalysierung des Ephedrins. *Arch. f. exper. Path. u. Pharmacol.* 157:90 1930
- Crimmon, J. M. and Tainter, M. L. Action of sympathomimetic amines on the heart lung preparation. *J. Pharmacol. & Exper. Therap.* 64:190 208 1938
- Idem. Comparative pressor efficiency of sympathomimetic amines in the normal state and in decerebrate shock. *J. Pharmacol. & Exper. Therap.* 66:146 170 1939
- Waud, S. P. The effects of toxic doses of benzyl methyl carbinamine (benzedrine). *Can. J. A. M. A.* 110:205 1938
- Reinhardt, E. C., Jr. and Davidoff, E. Benzedrine sulphate therapy the present status. *New York State J. Med.* 39:42 57 1939
- Davidoff, E. and Reinhardt, E. C., Jr. Method of studying some of the physiologic actions of benzedrine sulfate report of ten cases. *J. Lab. & Clin. Med.* 23:700-711 1938
- Davis, P. L. and Stewart, W. B. The use of benzedrine sulfate in post encephalitic parkinsonism. *J. A. M. A.* 110:1890 1892, 1933
- Anderson, E. W. and Scott, W. C. M. Cardiovascular effects of benzedrine. *Lancet* 2:1461 1936
- Prinzmetal, M. and Bloomberg, W. The use of benzedrine for the treatment of narcolepsy. *J. A. M. A.* 105:2051 2054, 1935
- Pecken, D. R., Tainter, M. L. and Cameron, W. M. Comparative actions of sympathomimetic compounds bronchodilator actions in experimental bronchial spasm of parasympathetic origin. *J. Pharmacol. & Exper. Therap.* 52:242 256 1935

39. Tainter, M. L., Pedden, J. R. and James, M. Comparative actions of sympathomimetic compounds bronchodilator actions in perfused guinea pig lungs. *J. Pharmacol. & Exper. Therap.* 51:371-386, 1934.
40. Baehr, G. and Pick, E. P. Pharmakologische Studien an der Bronchialmuskulatur der überlebenden Meerschweinchenlunge. *Arch. f. exper. Path. u. Pharmacol.* 74:41-91, 1913.
41. Jackson, D. E. The action of certain drugs on the bronchioles. *J. Pharmacol. & Exper. Therap.* 5:479-510, 1914.
42. Miller, H. and Piness, G. A synthetic substitute for ephedrine. *J. A. M. A.* 91:1033-1035, 1928.
43. Myerson, A. and Ruvio, M. Benzedrine sulfate and its value in spasm of the gastro intestinal tract. *J. A. M. A.* 107:24-26, 1936.
44. Rosenberg, D. H., Arens, R. A., Marcus, P. and Necheles, H. Benzedrine sulphate: its limitations in the treatment of the spastic colon and a pharmacologic study of its effects on the gastrointestinal tract. *J. A. M. A.* 110:1994-1999, 1938.
45. Beyer, K. H. and Meek, W. J. Effect of benzedrine sulfate on gastric emptying and intestinal activity. *Arch. Int. Med.* 63:752-759, 1939.
46. Myerson, A. and Thau, W. Human autonomic pharmacology. IX. Effect of cholinergic and adrenergic drugs on the eye. *Arch. Ophthalmol.* 18:78-90, 1937.
47. Peoples, S. A. and Guttman, E. Hypertension produced by Benzedrine: its psychological accompaniments. *Lancet* 1:1107-1109, 1936.
48. Dill, D. B., Johnson, R. E. and Daly, C. Metabolic effects of adrenalin and benzedrine. *J. Biol. Chem.* 128:xx, 1939.
49. Tainter, M. L. Use of the Gibbs artificial heart in the study of circulatory phenomena, with descriptions of improvements in the device and of responses to some drugs. *Arch. internat. de pharmacodyn. et de therap.* 42:186-199, 1932.
50. Beyer, K. H. and Skinner, J. T. The determination of the excretion of beta phenylisopropylamine (benzedrine) by man. *Am. J. Physiol.* 126:433, 1939.
51. Smith, L. C. Collapse with death following the use of amphetamine sulphate. *J. A. M. A.* 113:1022, 1939.
52. Davidoff, E. and Reifenstein, E. C., Jr. The results of 18 months of benzedrine sulfate therapy in psychiatry. *Am. J. Psychiat.* 95:945-970, 1939.
53. Wilbur, D. L., MacLean, A. R. and Allen, E. V. Clinical observations on the effect of benzedrine sulfate: study of patients with states of chronic exhaustion, depression and psychoneurosis. *J. A. M. A.* 109:549-554, 1937.
54. Myerson, A. The physiological and psychological effects of benzedrine. *J. Nerv. & Ment. Dis.* 85:202-206, 1937.
55. Council on Pharmacy and Chemistry. Present status of Benzedrine Sulfate. *J. A. M. A.* 109:2064-2069, 1937.
56. Ulrich, H., Trapp, C. E. and Vidgoff, B. Treatment of narcolepsy with benzedrine sulphate. *Ann. Int. Med.* 9:1213-1221, 1936.
57. Ulrich, H. Narcolepsy and its treatment with benzedrine sulfate. *New Eng. J. Med.* 217:696-701, 1937.
58. Finkelman, I. and Shapiro, L. B. Benzedrine sulfate and atropine in the treatment of chronic encephalitis. *J. A. M. A.* 109-344-346, 1937.
59. Solomon, P. and Prinzmetal, M. The use of benzedrine in post-encephalitic Parkinsonism. *J. Nerv. & Ment. Dis.* 85:202, 1937.
60. Solomon, P., Mitchell, R. S. and Prinzmetal, M. Use of benzedrine sulfate in postencephalitic Parkinson's disease. *J. A. M. A.* 103:1765-1770, 1937.
61. Bloomberg, W. Treatment of chronic alcoholism with amphetamine (Benzedrine) sulfate. *New Eng. J. Med.* 220:129-135, 1939.
62. Davidoff, E. Clinical study of the effect of benzedrine therapy on self absorbed patients. *Psychiatric Quart.* 10:652-659, 1936.
63. Davidoff, E. and Reifenstein, E. C., Jr. Treatment of schizophrenia with sympathomimetic drugs: benzedrine sulfate. *Psychiatric Quart.* 13:127-144, 1939.
64. Guttman, E. and Sargent, W. Observations on benzedrine. *Brit. M. J.* 1:1013-1015, 1937.
65. Woolley, L. F. The clinical effects of benzedrine sulphate in mental patients with retarded activity. *Psychiatric Quart.* 12:66-83, 1938.
66. Brønnsen, P., Jacobsen, E. and Thesleff, H. Subjective effect of beta phenylisopropylaminesulfate on normal adults. *Acta. med. Scandinav.* 97:89-131, 1938.
67. Johnson, G. S. personal communication.

ENCEPHALOPATHY FOLLOWING NEOARSPHENAMINE THERAPY*

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CINCINNATI

THE occurrence of central-nervous-system reactions following the intravenous administration of the arsphenamines is infrequent, and the clinical and pathological pictures of these catastrophic states have not become clear to the physician. Smith and Newbill¹ in 1939 found 175 cases of arsenical encephalitis in the literature. Glaser, Imerman and Imerman² in 1935 made an exhaustive study of the literature to determine the frequency of so-called "hemorrhagic encephalitis and myelitis" secondary to intravenous arsphenamines. These authors collected 146 cases of encephalitis, 8 of myelitis and 4 of encephalomyelitis from a group of 191,125 patients who had received 1,108,778 injections of the arsphenamine compounds. The incidence of death due to central-nervous-system involvement was 1 in every 5398 cases, or 1 in every 28,768 injections. The mortality rate of patients suffering from arsphenamine encephalitis was 76 per cent. Glaser, Imerman and Imerman pointed out that these reactions occur also in non-syphilitic cases and are apparently unrelated to the age and sex of the patient, to the quantity of

the drug administered, to the number of injections given, or to the toxicity of the drug.

Toxic reactions in the central nervous system occur most commonly after the second dose (50 per cent in the series of Glaser, Imerman and Imerman), and usually develop from twelve to one hundred and forty-four hours after the injection. It has been noted² that only 0.5 per cent of the reactions occurred between the ninth and fifteenth injections.

We are reporting the clinical and pathological findings in a case of encephalopathy that occurred after the fifteenth intravenous injection of neoarsphenamine. This late reaction is quite unusual and merits consideration. The pathological picture presented differs somewhat from that characteristically described as "hemorrhagic encephalitis" following arsphenamine.

CASE REPORT

E. B., a 27-year-old married Negress, had been treated in various clinics of the outpatient department of the Cincinnati General Hospital since January 11, 1939, for many unrelated complaints, including vaginal bleeding, inability to become pregnant, tumor of the breast (a fibroadenoma was subsequently removed) and an infected dog-bite wound of the hand. Otherwise the general physical and neurologic status had been normal. On April 25, 1939, a blood Wassermann reaction was positive, although tests performed 1 year and also 1 month pre-

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viously in other hospitals had given negative reactions. Another serologic blood test, done on June 1, 1939, confirmed the positive result. On this basis, antsyphilitic therapy was begun. From June 19 to August 28, the patient received ten weekly intramuscular injections of bismuth (2 cc of bismuth subsalicylate in oil). From September 1 to November 17 neosphenamine was administered intravenously at weekly intervals, each dose containing 0.6 gm. Another course of weekly injections of bismuth was then given from November 20 to January 22, 1940. From January 26 to February 23 neosphenamine was given weekly—0.6 gm to the dose. Thus by February 23, the patient had received the fifteenth injection of the arsenical.

On February 27, the patient was admitted to the hospital in a comatose state. An inadequate history was obtained from the employer. The patient had been in good health until noon on February 25, when she complained of slight headache and dizziness. She was unable to perform her duties as a housemaid. Later that day the headache became intense, and she went to bed. On the morning of February 27, she became delirious, and gradually lapsed into coma. She was then brought to the hospital.

The patient was unconscious, breathed stertorously, and was obviously seriously ill. General physical examination revealed a well nourished and well developed colored woman with a warm, dry skin and a generalized, mild lymphadenopathy. Examination of the heart, lungs, abdomen and extremities was essentially negative, and there was no cutaneous abnormality.

The obviously important findings were confined to the nervous system. The pupils measured 6 mm in diameter and were equal in size and regular in outline. They dilated widely when a flashlight was shone into them, and then slowly contracted through a small range, despite the maintained light. The eyes tended to wander to the left but were quickly jerked back to the mid line with coarse, nystagmoid movements. The optic fundi were normal. There was, at times, increased resistance to passive movements of all the muscles of the trunk and extremities. These periods were marked by tonic extension or spasm, which lasted from 15 to 20 seconds. Following these episodes, muscular tone became notably decreased, and the respirations became slow and shallow. There was no spontaneous purposeful movement. The only response to painful stimuli occurred on severe supra-orbital pressure, which caused the patient to grimace slightly. The tendon reflexes in the arms and legs were hyperactive bilaterally. The Hoffmann sign was strongly positive on both sides, and the plantar responses were flexor bilaterally. No abdominal reflexes were obtained. There was mild stiffness of the neck, but no Kernig or Brudzinski signs were elicited.

The course was steadily downhill. On the day following admission, the periodic tonic extensor spasm had disappeared. Muscular resistance and the tendon reflexes were normal and equal in all the extremities. However, Cheyne-Stokes respiration appeared, and death ensued in the early morning of February 29.

The temperature varied from 99.4 on admission to 100.8° F terminally. The pulse rate ranged from 86 to 120, and the respirations from 22 to 36 per minute.

A lumbar puncture performed on admission revealed an initial pressure of 300 mm of water. The cerebrospinal fluid was clear and colorless and contained 1 lymphocyte and 3 red blood cells per cubic millimeter. The Pandy reaction was +, +, +, and the total protein 205 mg per 100 cc. The cerebrospinal fluid Wassermann re-

action and gold sol curve were negative. At a second lumbar puncture the following day a cerebrospinal fluid pressure of 200 mm. was demonstrated. The fluid was clear and colorless, and contained no white cells and 8 red blood cells. The Pandy reaction was +, a quantitative protein determination was not done on this fluid.

The red cell count was 3,910,000, and the white cell count 5000. The differential picture was normal, and the hemoglobin 12.2 gm. The urine was normal.

Autopsy. The pathological findings exclusive of those in the nervous system were confluent lobular pneumonia with acute fibrinous pleuritis, acute bronchitis, left ventricular hypertrophy, severe toxic hepatitis and focal necrosis of the liver, acute splenitis, toxic nephrosis, early atherosclerosis of the aorta, mild pleural fibrosis, cystic right ovary, intracranial fibroadenoma of the breast, and leiomyoma of the uterus.

The right lung weighed 600 g, the left 275 g. The right middle and lower lobes were swollen, and varied in consistence from a subcapitate state to complete loss of crepitus. The lowermost portion of the middle lobe and the entire lower lobe on the right were dark red, mottled and irregularly friable on section. The remainder of the right lung and the entire left lung were normal, except for moderate congestion of the dependent portions of the latter. A section of the right lower lobe was removed with sterile precautions, and no pneumococcus could be identified from this material in the laboratory. Microscopic examination of tissue from the involved lobes confirmed the diagnosis of confluent lobular pneumonia. There were some signs of aspiration. All the evidence indicated that the pneumonia was of the hypostatic or terminal type.

Examination of the nervous system was limited to the brain, which weighed 1325 g. The convolutions were moderately flattened and broadened and the vessels of the meninges were congested. There was herniation of the uncus of the temporal lobe on both sides, more marked on the left. There was a well defined cerebellar pressure cone, which, although small, was sharply indented, particularly on the left side. The vessels of the circle of Willis were soft, and the circle was of normal configuration.

The most notable feature of the sectioned brain was the presence throughout the white matter of discrete or confluent bright red, pinpoint lesions, resembling petechiae. The tendency to symmetrical involvement of both hemispheres was striking (Fig 1). Macroscopically it was noted that the gray matter of the convolutions and basal ganglia was not involved. The morbid process was widespread extending from the frontal to the occipital poles, and it spared none of the lobes. However, the internal capsule and the corpus callosum were more extensively involved than other structures. The sectioned brain stem and cerebellum revealed only a few scattered petechiae in the cerebellar brain.

Microscopically, the brain lesions consist of widespread and multiple foci of perivascular softening and demyelination. These are disseminated throughout the cerebral hemispheres, but are not found in the brain stem. These foci are present only in the white matter. In the center of the lesion there is a capillary or precapillary vessel with markedly swollen or completely destroyed endothelium. Immediately surrounding the central vessel there is an area of necrosis, which is relatively acellular, but in which a few macrophages with ingested pigment are noted. Pigment also lies free in these foci, and there are a few oligodendroglia and astrocytes in the perivascular spaces. Of course, these areas are denuded of myelin.

Surrounding these regions of necrosis is an occasional collar of neuroglia, composed of oligodendroglia and astrocytes. Only an occasional, recent, perivascular hemorrhage is seen in the subcortical white matter, internal capsule, corpus callosum and anterior commissure.

Vascular changes are widespread, and involve both gray and white matter, although they are more marked

reaction, but the vessels are moderately congested. There is no histological evidence of syphilis.

It has been suggested that this type of lesion in the nervous system may be associated with acute infection, and cases have been reported to support this thesis. Pneumonia was found at autopsy

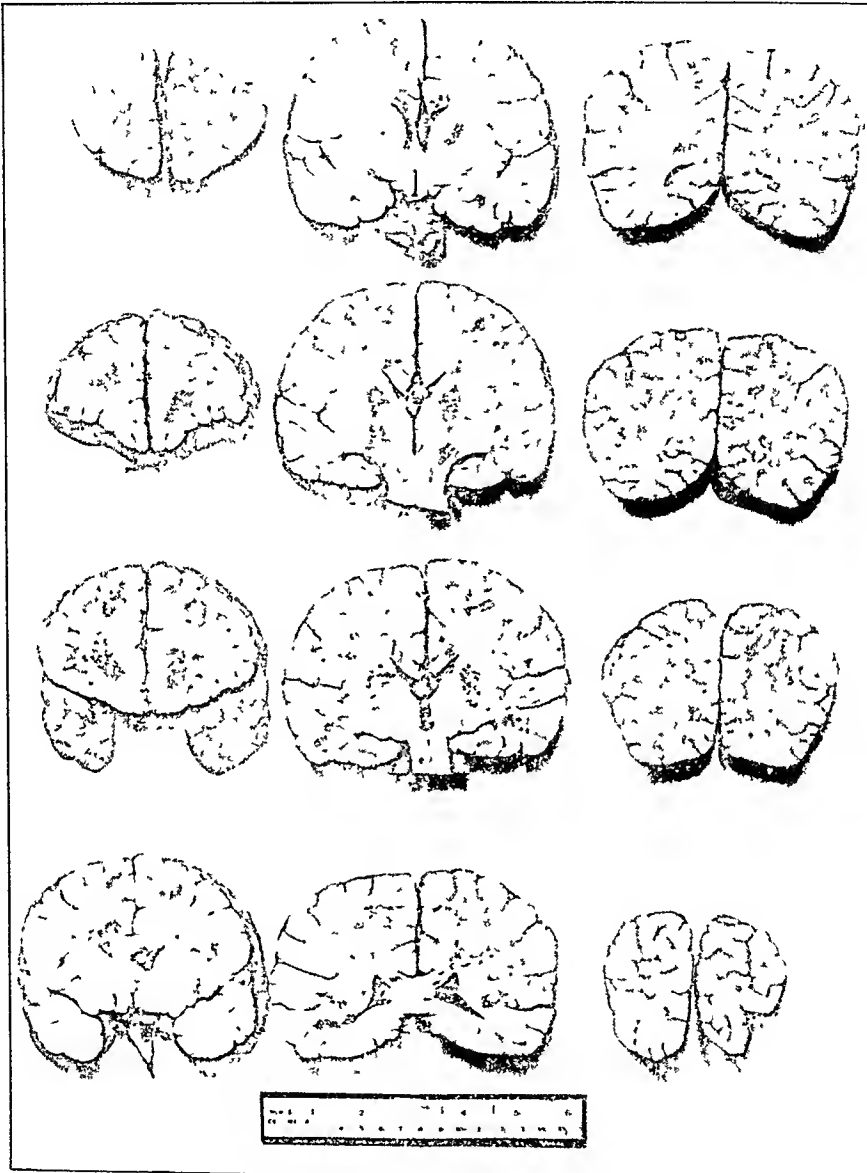


FIGURE 1.

Note the discrete, pinpoint and confluent lesions resembling petechiae, limited macroscopically to the white matter. The cerebrum was sectioned vertically into blocks 1.5 cm. thick. The position of the first block has been reversed to show the anterior extent of the process in the frontal poles. The corpus callosum was sectioned at autopsy to allow for better penetration of the formalin solution.

in the latter. The endothelium of some of the capillaries is hypertrophied so that, at times, the lumina are completely obliterated. Occasionally a thick hyaline thrombus completely occludes the lumen.

The changes in the nerve cells of the hemispheres and the brain stem are widespread and consist chiefly of moderate to severe chromatolysis. There is some glial proliferation. The leptomeninges contain no inflammatory

in this case, but the mildness of the infection clinically and pathologically seems to indicate that the encephalopathy was not based on this infection. There were no signs of pneumonia before death. The rectal temperature did not go above 100.8°F., and the white-cell count fifty-two hours after the onset and thirty-six hours before death was

5000 Neither of these facts points to infection. The clinical signs were those of an overwhelming neurologic catastrophe that resulted in death eighty-eight hours after the initial symptom of slight headache. Nevertheless, the possibility that an acute infection was responsible for the encephalopathy in this case cannot be discarded.

The findings in this case deviated somewhat from the usual clinical and pathological descriptions of so called "arsphenamine encephalitis." The unusual feature was the onset forty eight hours after the fifteenth intravenous injection of neoarsphenamine. So far as we have been able to determine, there has been no authenticated case in which the disease occurred so late. As pointed out by Glaser, Imerman and Imerman,² Alpers,³ and Russell,⁴ the late occurrence of encephalopathy strongly suggests the possibility of sensitization of the cerebrovascular tree as the pathogenetic element, rather than the toxicity of arsenic per se, if this element is responsible.

The important pathological point was the occurrence of focal perivascular demyelinated areas of necrosis, widely distributed throughout the white matter of the cerebral hemispheres and largely unassociated with petechial hemorrhages. Russell⁴ has pointed out that the necrotic foci do not represent a later stage of hemorrhage, but that the two processes, hemorrhage and perivascular necrosis, are quite independent of each other.

Thus, the cognomens "brain purpura" and "hemorrhagic encephalitis" are in reality misnomers, for the hemorrhagic phenomena may play but a minor role. The blood-vessel changes were marked in this case, and were noted in the gray and white matter.

SUMMARY

A fatal case of encephalopathy that occurred forty-eight hours after the fifteenth intravenous injection of neoarsphenamine is recorded. Confluent lobular pneumonia and toxic changes in the viscera were found at autopsy, in addition to the lesions in the nervous system. The most important lesions in the nervous system were focal perivascular areas of necrosis unrelated to hemorrhage. The perivascular necrosis was in relation to changes in the small blood vessels, chiefly of the endothelium, which not infrequently occluded the vessel. Petechial hemorrhages, which occurred probably simultaneously but apart from the perivascular necrosis, did not seem to be important in the analysis of the lesions of the disease.

REFERENCES

- 1 Smith D C and Newbill H P Arsenical encephalitis: review and report of a case with autopsy. *South M J* 32:381-387 1939
- 2 Glaser M A, Imerman C P and Imerman S W So called hemorrhagic encephalitis and myelitis secondary to intravenous arsphenamine. *Am J M Sc* 189:64-79 1935
- 3 Alpers B J So called brain purpura or hemorrhagic encephalitis: a clinicopathologic study. *Arch Neurol & Psychiat* 20:497-523 1928
- 4 Russell D S Changes in the central nervous system following arsphenamine medication. *J Path & Bact* 45:357-366 1937

MEDICAL PROGRESS

TUBERCULOSIS

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DR. HENRY D. CHADWICK,¹ in his 1940 address as president of the National Tuberculosis Association, estimated that if the average decline of the last two decades can be maintained, the death rate from pulmonary tuberculosis in the United States will be 32 in 1950, 21 in 1960, 14 in 1970, 9 or 10 in 1980, and that "the bells that ring in the year 2000 may sound the death knell of the tubercle bacillus." In weight reduction, however, it is the last pounds that are the hardest to take off, and perhaps one should not expect to the last a steady decline in the death rate. In the meantime, there are wars and rumors of wars that may upset all calculations. It is therefore natural in this review to turn to the relation of tuberculosis to war, and since at present the United States is not fighting but assembling an army, the first problem concerns the detection of tuberculosis in the recruits for that army. Such a study outlines present methods of the diagnosis and control of tuberculosis.

TUBERCULOSIS AND THE UNITED STATES ARMY

As the United States begins its second draft of manpower in less than twenty-five years, one is appalled at the large number of patients with active or potentially active tuberculosis that were taken into the service in the draft of 1917, and the drain on the financial resources of the country that these cases have since become. The problem is very clearly stated by Spillman,² whose article is the source for the facts in the following four paragraphs.

The inadequacy of physical examination. It is difficult to realize how great a change has taken place in the diagnosis of pulmonary tuberculosis in the last twenty years. In 1917 the final criterion for determining the existence of active pulmonary tuberculosis was the presence of persistent post-tussal moist rales. This rule was adopted by the Army Medical Department on what it considered the best authority of the day. It is true that even at that time a few roentgenologists, particularly Dr. Lewis G. Cole, tried to induce the Surgeon General to make the roentgenogram and not physical signs the decisive factor in diagnosis; but the difficulty in obtaining enough imported

glass plates, the cost of photography and the lack of trained roentgenologists seemed insuperable obstacles. Since then it has been proved that if one does rely on the discovery of rales, seven eighths of the early active lesions, as shown in the x-ray film, will be missed. Cole made a start in the collection of evidence of the superiority of x-ray diagnosis when in 1917 and 1918 he found that of 19 cases without physical signs but with x-ray evidence of pulmonary tuberculosis, at least 8 became heavy compensation liabilities because of the development of active processes.

The blame for many of the cases of tuberculosis taken into the Army cannot be placed, therefore, on the examining physicians but on the method of examination then in vogue. Nevertheless, one reads with surprise, that there were "... enormous numbers of health seekers whom the boards of the first draft sent, thinking that change of climate might benefit the manifestly tuberculous. . . ." This was obviously unfair to the Government and to the healthy comrades thus exposed to the disease, although it must be admitted that the danger of exposure in adult life was not appreciated then as it is now.

The cost of missed cases. In 1922, 36,600 soldiers received compensation for tuberculosis, and in 1939, 55,634, including 1947 deaths for that year. The approximate cost to the Government from 1917 to 1941 is as follows:

Cost of vocational training	\$129,000,000
Insurance	130,000,000
Compensation	600,000,000
Hospital care	100,000,000
Total	\$959,000,000

This does not include the cost of hospital construction. And Spillman points out an additional fact:

Every month that goes by sees approximately three million dollars for compensation added to this bill. . . . It becomes a nice problem in accounting to estimate, from the foregoing data, just how much it costs to take a man into the service when he has tuberculosis. . . . I make it out somewhere around \$10,000 per man to date, certainly not less than \$7500, a figure to which can be added at least \$50 a month for the rest of the

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man's life and compensation benefits for his dependents after his death

The use of the x ray in the present draft Obviously no man with tuberculosis should be taken into the service, and the way to detect the disease is to x-ray the chests of all volunteers and draftees. Fortunately, such study is rapidly becoming part of the routine examination for admission to the Army. How many applicants will be rejected is not yet known, although the preliminary unofficial figures for Massachusetts reveal that to date only 0.6 per cent of the x-rays of 9000 recruits have shown tuberculous lesions, including active, suspicious and apparently healed ones, the three groups being about equal in size. Calcified childhood lesions are not included in these figures.

Statistics from the Canadian and Australian armies Adamson⁷ writes from Canada that as a result of ordering a chest plate of every recruit there have been 1.06 per cent rejections because of tuberculosis. He adds, "The general conclusion, namely, that 20 recruits will be discarded for every one of the population that dies each year of tuberculosis, is likely accurate." These rejections are necessary because experience during and since the last war shows that "for every 100 killed in action, 6 have died of tuberculosis; for each 100 pensioned for wounds, 25 have been pensioned for tuberculosis."

Cooper⁸ reports that of 9000 recruits for the Australian army 1.33 per cent showed evidence in the lung fields of past or present tuberculous infection of the secondary adult type, whereas 0.55 per cent showed active pulmonary tuberculosis.

CASE FINDING IN THE APPARENTLY HEALTHY CIVIL POPULATION

The following studies on case finding in the civil population have been reported during the year. Plunkett and Mikoi⁹ report the results of routine x-ray examinations of 4853 adult admissions to fourteen general hospitals in ten cities of upstate New York during 1937 and 1938. In 128 of these, or 2.6 per cent, there was evidence of the reinfection type of tuberculosis. Of these, 51, or 1.1 per cent of the total, presented clinically significant lesions. In about half, tuberculosis had not been considered a possibility, and the survey revealed the first evidence of the disease. These and other published figures have been used as the basis for a campaign to make an x-ray examination of the chest of every patient admitted to general hospitals.

In a special supplement to the *American Review of Tuberculosis*, Edwards,¹⁰ the director of the Bureau of Tuberculosis for New York City, writes on

"Tuberculosis Case-Finding: Studies in mass surveys." Robins and Ehrlich¹¹ have summarized these studies in an article on "Group X-ray Surveys in Apparently Healthy Individuals." Their outstanding figures are the following:

High school students Of 14,177 high school students with an average age of 16.5 years, 0.4 per cent had active lesions.

Home relief population of Harlem In Harlem, 53,237 persons, predominantly Negro and Porto Rican, with an average age of 36.3 years, showed 3.1 per cent active and 1.0 per cent arrested tuberculosis.

Prison population In 2477 prisoners with an average age of 38.7 years, four fifths of whom were men, 5.9 per cent active and 5.3 per cent arrested disease was demonstrated.

Homeless men Among 3643 homeless, with an average age of 49.6 years, there was 5.2 per cent active and 10.9 per cent arrested disease.

Among the conclusions drawn were the following: In such studies the incidence of clinically significant pulmonary tuberculosis varies with the age, sex, race and economic level of the population studied. The greatest effort should be expended on adults and groups of low economic level. The majority of the cases, 70 per cent of the total, were discovered in the minimal stage. The incidence of active tuberculosis is lower in Negroes than in Whites among the apparently healthy population. This fact is surprising to most people, because the mortality rates for the Negroes by specified age and sex divisions are five to ten times those of the Whites, apparently owing to the fact that the Negro is more likely to develop acute exudative than fibrotic tuberculosis.¹²

Hedvall¹³ reports a new study on the incidence of tuberculosis in university students. X-ray studies of 638 medical students at the Lund University in Sweden showed 11.3 per cent pulmonary tuberculosis. He believes, but does not prove, that a large proportion of these infections are contracted during post mortem examinations. This possibility deserves further study.

Lyght¹⁴ reports on college students in this country. In 1938 and 1939 he found that there were 165 colleges supporting case finding by tuberculin tests and x-ray study. In these colleges 348,713 students were checked, and 241 or 0.7 per cent demonstrated clinically active disease. In 117 colleges where there was no case-finding program, 129,851 students were enrolled, and only 4 active cases were reported during the year.

REDUCING THE COST OF MASS X-RAY EXAMINATION

From the foregoing studies it is evident that one must look for early tuberculosis in the apparently healthy, but it is expensive to x-ray large

numbers. Therefore, much attention has been given to developing a cheap but effective method of x-ray examination. The following technics have been suggested and the results reported.

Fluoroscopy. The first method, and obviously the cheapest, is fluoroscopic examination. With the new fluoroscopic screen, a modern tube and an experienced observer, such an examination will bring to light almost all clinically significant cases, but a few potentially serious minimal cases will be missed. The best evaluation of this method is by Fellows and Ordway¹¹ of the Metropolitan Life Insurance Company, who state that in 1937, 2603 persons were examined by both fluoroscopy and standard x-ray films. The latter demonstrated pulmonary tuberculosis in 109 cases, in 14 of which the diagnosis had been missed on fluoroscopic examination, making the percentage of error 13. Of the 14 missed cases, "5 were latent or clinically insignificant, while 9 were considered clinically active." Another criticism of the fluoroscopic method is that it does not give a permanent record.

Miniature photographs of the fluoroscopic screen. Another suggested economy is to photograph on a small film the image on the fluoroscopic screen and thus eliminate the costly 14-by-17-inch standard film. Two sizes of film have been used for these fluorograms, the 35-mm. and the 4-by-5-inch. The camera holding the film has a special lens and is placed at the small end of a pyramid-shaped tunnel, with the fluoroscopic screen at the other end. The person to be x-rayed stands against the screen with the x-ray tube at the proper distance behind him. To ensure clear-cut shadows the fluorescent screen is seven times as fast as the usual Patterson screen. The cost of the complete equipment, including a \$700 rotating anode tube, is \$6000 to \$8000. If there is already a complete x-ray installation, the extra equipment required—the tunnel with fluoroscopic screen and camera with special lens—costs about \$2500.

Some investigators are enthusiastic about the 35-mm. film, but most agree that significant lesions are often missed in a small image that must be enlarged by a projector before it can be read. Present opinion favors the 4-by-5-inch film, which can be read without enlargement. Potter designed the apparatus and studied with Douglas and Birkelo^{12, 13} 1610 clinic cases, using both the standard 14-by-17 and the 4-by-5-inch film for each case. With the standard method they found 271 active tuberculous lesions, 7 of which were not visible in the small films. The missed lesions were very small and were obscured by a rib in the small film. The percentage of error is, therefore, 2.6. In a test run, 73 persons were x-rayed in sixty-five minutes

at a film cost of about one tenth that of the standard size. An additional argument in favor of the small films is the smaller space required for storage.

AIDS IN INTERPRETING THE X-RAY FILM

Whatever the x-ray method, there will always be a significant number of asymptomatic cases in which the most experienced roentgenologist will have difficulty in determining whether the shadow is that of an active or inactive tuberculous process. Furthermore, even if the lesion is active from the histologic standpoint, will it heal without ever giving symptoms? So much has been published about the value of the differential white-cell count and the red-cell sedimentation rate in determining activity that a review of the salient points is in order.

Differential white-cell count. The value of the differential count of the white blood cells depends on the theory that the increase in the number of each type of cell in the blood parallels the predominance of that type of cell in the tuberculous lesion itself. Therefore, an increase in the large mononuclear cells in the blood is said to demonstrate new tubercle formation in the lungs, with large numbers of endothelial monocytes forming the tubercles. On the other hand, if the tuberculous lesion is healing, the number of lymphocytes in the blood will be increased because there is a collar of lymphocytes encircling the tubercles. Lastly, if there is cavity formation in the lung tissue, the influx of polymorphonuclears will be accompanied by an increase in these cells in the blood. Various authors give the numbers and relative numbers of the different white cells in percentages, in counts per cubic millimeter, in the monocyte-lymphocyte ratio, or by the Medler index, which is a single number calculated from the number of polymorphonuclears, lymphocytes and monocytes. In general, the rules given hold, but the great weakness in the method is that small active lesions may appear in the x-ray film and may increase in size for at least a few weeks before any change is evidenced in the differential count. It is true, also, that the cell count may be normal in the presence of advanced fibrocavernous disease with positive sputum.

Red-cell sedimentation rate. Active infection of any kind is usually accompanied by an increase in the fibrinogen content of the blood and a consequent increase in the sedimentation rate of the red cells. If, therefore, there is an active tuberculous lesion, the sedimentation rate should be increased in proportion to the severity of the infection. Again, in general, the rule holds; unfortunately, however, minimal active disease may exist without changing the sedimentation rate. It has been found,

too, that once the rate is elevated, it may continue thus long after the process is clinically inactive. For this reason one cannot always wait for a normal sedimentation rate before discharging a patient from a sanatorium.

Relation between the differential count and sedimentation rate. From the few cases reported, it appears that the first change shown in the blood after the beginning of tubercle formation is an increase in the large mononuclear cells, and that the change in the sedimentation rate comes later. Then as the process heals, the differential count returns to normal before the sedimentation rate.

Young polymorphonuclears. Without going into detail, the statement may be made (again with reservations) that an active tuberculous lesion is accompanied by an increase in the young polymorphonuclear cells in the blood. The difficulty lies in the determination of just what cells are young polymorphonuclears, and this makes the test unreliable except in the hands of an expert.

Blood studies and prognosis. A single blood study must be interpreted cautiously, but frequently repeated studies may have value in determining prognosis. Steady improvement in the blood counts may point to a favorable outcome before there is clear-cut regression of the x-ray shadow. On the other hand, in selecting patients for thoracoplasty some surgeons refuse to operate if there is an increasingly unfavorable blood change.

Examination of the fasting gastric contents. The value of examining the fasting gastric contents for tubercle bacilli has already been mentioned in previous reviews and recently in an editorial in the *Journal*.¹⁴ Suffice it to say that the value of this examination is increasingly appreciated, and that the activity of a pulmonary process may often be proved by the finding of tubercle bacilli in the gastric contents of a patient without cough or expectoration.

Stiehm¹⁵ has studied the blood and gastric contents of 40 subclinical cases, and concludes:

Of available laboratory methods, the erythrocyte sedimentation rate was found to be normal in 90 per cent of the cases, and apparently gives little assurance that a lesion is either benign or inactive. The leukocyte reaction, where favorable, indicates a favorable prognosis. An unfavorable or equivocal leukocyte reaction, however, indicated an unfavorable course in only 50 per cent of the cases. Gastric aspiration with guinea pig inoculation is the most reliable method of proving both the diagnosis and activity of the lesion.

DEVELOPMENT IN X-RAY TECHNIC

So much is being said in the x-ray departments of large hospitals about "laminagraph," "planigraph" and "tomograph" that a word of explanation is in place.¹⁶ These terms all mean that the

new apparatus is designed to record the shadow of a specific plane or layer of the lung and eliminate the shadow of tissue in the other planes. The aim is to keep the focus on one plane while varying the focus on all other planes so as to blur their shadows. The film is exposed longer than in ordinary roentgenography, and both the tube and the film move in such a way that the purpose mentioned above is accomplished. The tube is located above the patient lying on the table, and moves in a plane parallel to that of the table. The film rests on a support under the table, and moves in the opposite direction from the tube. The two are joined in such a way that they move simultaneously. The plane desired in focus is at their fulcrum. Changing the level of the fulcrum makes it possible to x-ray successive levels of the chest.

The laminagraph is particularly helpful in demonstrating the large bronchi. Its main use in tuberculosis is to disclose cavities otherwise unseen because of overlying tissue. The real value of the procedure is yet to be established, and, of course, one of its drawbacks is the expense involved for the several films necessary to x-ray the different layers.

THE TREND OF SURGERY IN TUBERCULOSIS

The policy followed in these reports is not to discuss new methods until their practical value has been established, but at times one is justified in pointing out certain trends. The belief that incision into a tuberculous pulmonary process must lead to a permanent bronchial fistula or chest-wall sinus has so long been accepted that recent surgical experiences to the contrary are worthy of note. In certain cases it has been shown that lobectomy, pneumonectomy and cavity drainage may be performed as successfully in tuberculosis as in other diseases. Such procedures may be indicated, especially when bronchial obstruction makes physiologic drainage through the bronchus impossible. The time has not yet come, however, to discuss indications, contraindications and technics.¹⁷

MINOR NOTES

Chemotherapy. Articles on the use of sulfanilamide and allied compounds in tuberculosis continue to appear. The studies, in the main, have been experimental and the results somewhat confusing. Thus far there is little hope that these chemicals will be of value in clinical tuberculosis.¹⁸

BCC. Vaccination with the Calmette-Guérin bacillus is still being tried abroad and to a limited extent in this country. The wisdom of such vaccination remains questionable.

Twelve-day guinea-pig test. Pickoff¹⁹ injects silica powder subcutaneously into a guinea pig, and then into the same area injects the material suspected of containing tubercle bacilli. In twelve days, if there is a firm infiltration, the material is removed by syringe and stained for tubercle bacilli. Since it is known that tubercle bacilli develop more rapidly in the presence of silica, the method holds promise.

The supposed waxy capsule. Lembke et al.²⁰ give evidence from ultramicroscopic observations on tubercle bacilli that the oft-mentioned waxy capsule of the bacillus is a myth, and that actually the wax is distributed throughout the structure of the organism.

X-ray changes preceding a positive tuberculin reaction. Evidence is accumulating that in certain cases the x-ray shadow of a tuberculous process precedes the positive tuberculin reaction.²¹

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REFERENCES

1. Chadwick, H. D. A review of the campaign to eradicate tuberculosis. *New Eng J Med* 223:1001-1005, 1940
2. Spillman, R. The value of radiography in detecting tuberculosis in recruits. *J. A. M. A.* 115:1371-1378, 1940

3. Adamson, J. D. Canada eliminates TB from army. *Bull. No. 76* *Tuberc. A.* 26:163, 1940
4. Cooper, E. L. Pulmonary tuberculosis in recruits: experiences in a survey by microradiographic method. *Brit. M. J.* 2:245-248, 1940
5. Plunkett, R. E. and Mikol, E. X. Unrecognized tuberculosis in general hospitals. *Am. Rev. Tuberc.* 41:381-387, 1940
6. Edwards, H. R. Tuberculosis case finding studies in mass surveys. *Am. Rev. Tuberc.*, Supp. 41:1-159, 1940
7. Robins, A. B. and Ehrlich, D. E. Group x ray surveys in apparently healthy individuals. *Radiology* 34:595-607, 1940
8. Israel, H. L. and Payne, H. M. Tuberculosis in the Negro: clinical and roentgenological characteristics. *Am. Rev. Tuberc.* 41:188-220, 1940
9. Hedvall, E. The incidence of tuberculosis among students at Lund University. *Am. Rev. Tuberc.* 41:770-780, 1940
10. Lyght, C. E. Tuberculosis case finding among American college students. *Minnesota Med.* 23:465-470, 1940
11. Fellows, H. H. and Ordway, W. H. Fluoroscopy versus physical findings in the detection of pulmonary tuberculosis. *Nat. Tuberc. A. Tr.* 33:51-53, 1937. Control of pulmonary tuberculosis in an employee group. *Ibid.* 33:211, 1937.
12. Potter, H. E., Douglas, B. H. and Birkelo, C. C. The miniature x ray chest film. *Radiology* 34:283-291, 1940
13. Douglas, B. H. and Birkelo, C. C. The miniature x ray film of the chest. *Am. Rev. Tuberc.* 43:108-116, 1941
14. Editorial. The court of last appeal. *New Eng. J. Med.* 223:781, 1940
15. Stiehm, R. H. Subclinical pulmonary tuberculosis: a presentation of forty cases. *Ann. Int. Med.* 13:2285-2305, 1940
16. Kieffer, J. The laminagraph and its variations: applications and simplifications of the planigraphic principles. *Am. J. Roentgenol.* 39:457-513, 1938
17. Churchill, E. D. Report on medical progress thoracic surgery. *Am. Eng. J. Med.* 223:581-587, 1940
18. Corper, H. J. Chemotherapy of tuberculosis: a review. *Nat. Tuberc. A. Tr.* 36:67-78, 1940
19. Pickoff, F. L. Diagnosis of tuberculosis in 10-12 days by guinea pig inoculation. *Am. J. Clin. Path.* 9:339-344, 1939.
20. Lembke, A., Ruska, H. and Christophersen, J. Vergleichende mikroskopische und Uebermikroskopische Beobachtungen an den Erregern der Tuberkulose. *Klin. Wchnschr.* 19:217-220, 1940
21. Levine, M. I. Sequence of roentgen evidence of tuberculosis and cutaneous sensitivity to tuberculin. *Am. J. Dis. Child.* 58:799-810, 1939

CASE RECORDS OF THE
MASSACHUSETTS GENERAL HOSPITALANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27131

PRESENTATION OF CASE

First Admission. A thirty-nine-year-old man entered the hospital complaining of low-back pain.

Three years before admission the patient had had lobar pneumonia complicated by an empyema, which was drained by rib resection. A satisfactory convalescence followed, but ever since he had tired rather easily. During the year before admission he suffered from frequent infections, notably acute axillary abscesses for which incision and drainage were found necessary. He entered the hospital complaining of low back pain radiating down the right leg. It was of gradual onset and had been present for five days, but the patient stated that he had had many such attacks during the past nineteen years, the usual diagnosis being sacroiliac strain.

The patient had had an appendectomy twenty-two years before admission, and four years later an attack of jaundice with clay-colored stools; three years before entry, he had had a streptococcal sore throat.

On examination the patient was well developed and well nourished, somewhat pale and appeared chronically ill. Examination of the chest revealed a systolic scratch, which became accentuated during expiration and disappeared on inspiration in the third interspace immediately to the left of the sternum; the blood pressure was 140 systolic, 90 diastolic. Examination of the abdomen was negative. There was tenderness in the right sacroiliac joint, and all movements were limited here and in the right leg, because of pain. Examination of the nervous system was negative.

The temperature, pulse and respirations were normal.

Examination of the urine showed a ++ test for albumin. Examination of the blood showed a red-cell count of 2,690,000 with a hemoglobin of 53 per cent, and a white-cell count of 6300. The differential count was normal. The color index was 1.06, the volume index 1.08, the cell volume 25 per cent, the sedimentation rate 71 mm. in one hour. The nonprotein nitrogen of the blood serum was 24 mg., the protein 10.7 gm., the calcium 11.7 mg., the phosphorus 3.6 mg. per

100 cc., the phosphatase 6.8 Bodansky units, the total cholesterol 64 mg. per 100 cc.; the chlorides were 95.1 milliequiv. per liter. A blood Hinton test was negative. A bromsulfalein test showed less than 5 per cent retention of the dye in the serum; a formal-gel test was strongly positive; a phenolsulfonephthalein test was normal. A lumbar puncture gave an initial pressure of 250 and a final pressure of 200 mm. of spinal fluid after the removal of 10 cc. The cells were not increased, and the protein was 57 mg. per 100 cc.; the spinal-fluid Wassermann test was negative.

X-ray films of the spine showed some increased density about the articulation between the fifth lumbar vertebra and sacrum on the right side. The articulating surfaces were indistinct, and the density of the bone increased. There was no displacement and no narrowing of the intervertebral spaces. The other joints appeared normal. There were no changes in the structure of the bones.

Two weeks after admission a sternal puncture was performed, and it was found that 25 per cent of the nucleated cells in the marrow consisted of plasmocytes and plasmoblasts. Following this procedure, many unsuccessful attempts were made to demonstrate Bence-Jones protein in the urine. X-ray studies of the skull, cervical spine and long bones showed no variation from normal. During hospitalization an abscess developed in the left axilla and was incised and drained. The patient was given three blood transfusions, and discharged six weeks after admission, at which time the blood showed a red-cell count of 2,660,000 with a hemoglobin of 60 per cent and a white-cell count of 5000.

Second Admission (eleven days later). In the interval, x-ray therapy had been instituted and the patient felt a bit stronger, but still noticed palpitation and shortness of breath on exertion. Ten days after discharge he suffered a fainting spell, and hospitalization was therefore advised. The cervical, axillary and inguinal lymph nodes were palpable, and the spleen could just be felt on deep inspiration. The blood showed a red-cell count of 2,700,000 with a hemoglobin of 53 gm., and a white-cell count of 3700. Bence-Jones proteinuria could not be demonstrated. X-ray treatment was discontinued, and the patient was given one 500-cc. blood transfusion and discharged a week later.

Third Admission (three weeks later). Since leaving the hospital the patient had been confined to his bed most of the time, and shortly after returning home developed a severe nosebleed, which lasted for two days. Two weeks before admission he caught cold, and after a bout of sneezing a "red blurring" affected sight in his right eye, at first in the upper field, then gradually spreading over

the whole field of vision. In general he felt weak, and suffered from a right-sided headache and almost complete deafness in the right ear. On examination he had obviously lost ground and was pale and emaciated. Examination of the fundi showed many hemorrhages throughout all layers of both retinas with numerous patches of exudate. A well-circumscribed hemorrhage was present in the right macula. The cervical, axillary and inguinal lymph nodes were palpable, and those in the left axilla were still draining. A systolic murmur was audible over the entire precordium, maximal at the apex; the blood pressure was 114 systolic, 70 diastolic. The spleen and liver were just palpable. There was slight clubbing of the fingers. The blood showed a red-cell count of 1,340,000 with a hemoglobin of 2.5 gm., and a white-cell count of 4100. The differential count and the platelets were normal.

The patient remained in the hospital for approximately two months and during this time received fourteen 500-cc. blood transfusions. Six weeks after admission the clotting time and clot retraction were normal, the prothrombin time 16 seconds (normal 19 seconds) and a hematocrit reading 16.3. One epistaxis occurred, and blood films on two occasions showed 1 per cent atypical lymphocytes and 1 per cent blast cells. At the time of discharge the patient was symptomatically improved, but the blood showed a red-cell count of 1,410,000 with a hemoglobin of 45 per cent and a white-cell count of 1500.

Fourth Admission (six months later). On three occasions during the two months after discharge the patient was given a 500-cc. blood transfusion. He improved remarkably, lived a normal life and was free from symptoms until three weeks before admission, when he noticed dyspnea on exertion associated with a feeling of fullness in the upper abdomen.

On examination the patient appeared tired and was pale. The neck veins were dilated, and showed pulsations of both auricular and ventricular character. There was considerable enlargement of the heart, the sounds were of fair quality, but there was a slight gallop rhythm; the blood pressure was 120 systolic, 80 diastolic. The liver and spleen were not palpable, but the abdomen was tender in the liver region. There was no peripheral edema.

The urine showed a + test for albumin, but no Bence-Jones protein. The blood showed a red-cell count of 3,210,000 with a hemoglobin of 10.2 gm., and a white-cell count of 6700. The non-protein nitrogen of the blood serum was 17 mg., the protein 7 gm. per 100 cc.

An x-ray film of the chest showed that the diaphragm was rather high on both sides but

moved fairly well with respiration. The lung fields were of normal brilliancy throughout. The vascular shadows at both lung roots were increased in size and density. The heart shadow was enlarged in all diameters, and the apex was blunted; the greatest increase was to the left in the region of the ventricle. There were no visible mediastinal masses; the great vessels appeared normal.

Films of the abdomen showed the liver shadow fairly well; it did not appear to be greatly enlarged; the spleen was indistinct, but did appear to be somewhat larger than normal. The kidney outlines were visible and normal, or slightly increased in size. There was no evidence of a lesion in the bones. A Graham test was normal. An electrocardiographic recording showed a normal rhythm at 90. T₁ was upright, T₂ low and slightly diphasic with probably slight late inversion. T₃ showed late inversion, and Q₃ was rather prominent. The P waves and PR interval were normal. This was repeated at the end of deep inspiration and showed a normal rhythm at 85; T₁ was very low, T₂, T₃ and T₄ moderately inverted; R₄ was present.

The patient was discharged on the second hospital day.

Fifth Admission (two weeks later). The patient was given digitalis at home, but did not improve. Dyspnea was still present, and he suffered from an unpleasant sensation of pressure in the abdomen and chest. Anorexia and malaise developed, and he began to lose weight. Additional findings on physical examination were as follows: The cardiovascular abnormalities were as before, but the pulmonary second sound was now greater than the aortic. A few rales were heard at both lung bases, and the tender liver was 5 cm. below the costal margin. The blood picture was much the same, and the platelets were decreased.

An electrocardiogram showed normal rhythm at 95. The P waves and PR interval were normal. There was some slurring of the QRS complexes, and their duration was about 0.1 second. S₁ and Q₃ were prominent; T₁ was low, but upright, T₂ and T₃ inverted. There was a bizarre Lead 4, with ST₄ slightly elevated and T₄ diphasic and slightly inverted. During hospitalization the patient was given x-ray therapy totaling 1000 r in the three weeks.

Final Admission (two weeks later). In the interval the patient had gradually lost ground. At the time of entry he was weak and cyanotic and the neck veins very distended. The heart findings were unchanged except for an appreciable increase in the systolic apical murmur. There was dullness at the right base, and rales at the left

base. The liver was larger; there was no peripheral edema. The patient was given two more 500-cc. blood transfusions, but lapsed into coma and died on the ninth hospital day, approximately one year after his first admission.

DIFFERENTIAL DIAGNOSIS

DR. ALFRED O. LUDWIG: There are many confusing leads in this case. I wonder if Dr. Holmes would show us the x-ray films, especially those of the spine and lungs.

DR. GEORGE W. HOLMES: I am quite familiar with this case, and I shall try not to give too much of it away. These films were taken because of pain in the back to see if there was a bone lesion. All that is described in the record is of no significance except for the statement that the spine showed increased density, and whether it actually does might even be questioned. The bones do seem more dense than one would expect in a sick person. Except for that, the x-ray evidence is of only negative value.

DR. LUDWIG: Is there any evidence of disease in the ribs?

DR. HOLMES: No.

DR. LUDWIG: I should like to ask if the marrow cavities seem increased in size.

DR. HOLMES: I think so, but that is a very unreliable finding, merely a guess. The skull is essentially normal.

DR. LUDWIG: Do these fine markings in the skull mean anything?

DR. HOLMES: I do not think so.

On the film taken at the fourth entry, there is definite evidence of variation in the heart and lungs. The heart shadow is increased in size. The apex is distinctly blunt, and the curve of the left ventricle is prominent. The enlargement is more to the left than in any other direction. There are also changes in the hilar region, and I think that the interpretation given was correct, that is, these changes were probably vascular and not neoplastic in origin.

DR. LUDWIG: Was there any definite evidence of tumor in the hilar nodes?

DR. HOLMES: There was no definite evidence of enlarged lymph nodes. I do not believe that one can absolutely rule out tumor. On the other hand, the appearance could be interpreted, along with the change in the heart shadow, as increased hilar shadows due to heart failure.

DR. LUDWIG: From the x-ray point of view, what should you say caused this condition?

DR. HOLMES: If I could dissociate what I know, I should say that it was the heart of hypertension.

DR. LUDWIG: Which, of course, the patient did not have.

DR. HOLMES: I think it is safe to say that the liver is enlarged. Here we see the spleen, certainly not very large, but on the borderline of being enlarged. The kidneys also look a little large. The patient was a rather small man, and the kidneys were not a long distance away from the film to account for magnification.

DR. LUDWIG: I think the kidneys should be large.

DR. HOLMES: So far as one can tell from the x-ray evidence, they are.

DR. LUDWIG: I have the impression that much of the evidence in this case is not very helpful in establishing the diagnosis that I think should be made. As I read this over I believed that the key to the correct diagnosis lay in the paragraph giving the laboratory findings. A number of things in that paragraph taken separately might not help, but taken together do. In the first place, albuminuria persisted throughout the illness; the patient had a normochromic, perhaps even somewhat hyperchromic, anemia; he had an extremely rapid sedimentation rate, a very definite hyperproteinemia of 10.7 gm., a slightly elevated serum calcium, a normal serum phosphorus and normal phosphatase, and a positive formol-gel test. The nonprotein nitrogen, chlorides, and liver-function and renal-function tests were within normal limits. I cannot explain the low cholesterol.

To go back to the story of back pain radiating down the leg, I first thought that it might be associated with the disease from which I believe the patient was suffering, and it may well be; but I do not believe if the attacks had been present for nineteen years that the two are related. A ruptured intervertebral disk might very well have caused these attacks. I have seen patients with ruptured disks in whom attacks persisted over such a period of time. The elevated total protein in the spinal fluid is confirmation, but there is no other evidence to allow that diagnosis.

In the second paragraph we are told that the sternal puncture showed that 25 per cent of the nucleated cells consisted of plasmocytes and plasmoblasts. This finding together with the clinical findings spell multiple myeloma in spite of the fact that there is nothing else to go with it. Albuminuria is extremely common in multiple myeloma—75 per cent of the cases reported in the literature have it. The absence of Bence-Jones protein is disturbing, but it is present in only half the reported cases. The normochromic or hyperchromic anemia is found in 90 per cent. The slight hypercalcemia and normal phosphorus and phosphatase are also consistent. Most striking is the high serum protein, —10.7 gm.,—which is one of the most typical findings in multiple myeloma. It is

probably secondary to the elevation of the globulin fraction, which also accounts for the very rapid sedimentation rate and the positive formol-gel test. In addition, a high globulin content in the serum tends to cause clotting with Hayem's solution if that is used as a diluent in doing the red-cell count. Whether or not that was noted here I do not know. Dr. Holmes has already discouraged me from the x-ray point of view. I should have expected evidence of multiple myeloma in the bones, and we have none unless we can interpret increased marrow spaces in the long bones as secondary to tumor in this location.

This patient ran a course of anemia and increasing cardiac difficulty. We are told that a little later the spleen was palpable and that the lymph nodes became enlarged. In about half the cases of multiple myeloma recently autopsied here that Dr. Jacobson got together in 1929 the spleen was enlarged, and it is known that in multiple myeloma metastases to internal organs and also to lymph nodes may occur, although this is exceedingly rare. I do not know of any other condition that would give the sternal biopsy findings that we have in this case. If we grant that the patient had multiple myeloma, I think we still have a great deal to explain. What happened to him just before the third admission? The "red blurring," the deafness in the right ear, and right-sided headache, I should be inclined to account for on the basis of hemorrhage into the retina and also perhaps cerebral hemorrhage. We know that he had anemia and probably decreased platelets as well, which may have produced a tendency to bleed. The exudate in the retina is a little disturbing in that respect. The serum protein was normal on this admission. Perhaps Dr. Jacobson can tell us whether in any of his cases the protein returned to normal. I do not know whether that occurs in multiple myeloma.

Then we plunge into what is for me an uncharted field,—electrocardiography,—and I shall have to ask for help. I should interpret the findings as indicating a marked degree of myocardial damage. Can anyone help me?

DR. HOWARD B. SPRAGUE: It is difficult for me, as it is for Dr. Holmes, to dissociate myself from the knowledge of the case, because I came in through the back door of electrocardiography. I can only say that in the original interpretation of the electrocardiogram before I saw it, it was suggested that there was some myocardial coronary disease. We took special respiratory tracings to see whether we could change the direction of the T waves by change in the position of the heart, but the findings remained, and I suggested that they

might mean pericardial disease—but I shall discuss that later.

DR. LUDWIG: Certainly, so far as I am concerned, this cardiovascular picture is very mysterious. Here is a man with a heart condition that looked as if it were due to hypertension, and he had no hypertension. It may be—if my original diagnosis of multiple myeloma is correct—that the renal changes associated with this disease play a part. However, I should expect, if that were so, that there would have been some hypertension. In some of the cases of myeloma with secondary nephritis, the patients have had hypertension, but in others it is absent. If this man had some other form of neoplastic disease, I should seriously suspect cardiac metastases. He died primarily a cardiac death, became increasingly weak, cyanotic and dyspneic, had dullness at the right base, rales at the left base, and evidence of enlargement of the liver and spleen, probably due to congestion. The kidneys probably were increased in size and may present the picture seen in these organs in multiple myeloma, a nephritis due supposedly to a plugging of the tubules with Bence-Jones protein. In summary, I think that one must make a diagnosis of multiple myeloma. I am unable to explain the cardiovascular signs and symptoms. It may be that the extensive radiation therapy accounted for the atypical course of the disease and the absence of bone changes.

DR. FRANK T. HUNTER: Is it possible to find out whether that second serum protein of 7 gm. was done by the Kjeldahl or the specific-gravity method? We recently found in multiple myeloma that the specific-gravity procedure has no value. One can get a perfectly normal protein with that method and with the Kjeldahl method double it. I had one patient with a Kjeldahl value of 10 gm. and a specific-gravity value of 6.5.

DR. WILLIAM B. BREED: I will say that by the same process of thought and on the same basis of laboratory evidence we used myeloma as a working diagnosis through until the end. I think it is wrong to ignore the finding of these cells in the sternal smear. The smear was verified by Dr. Jacobson and Dr. Mallory. I think that some thing should be said about the x-ray treatment in this case. Dr. Holmes was interested in it and although there had not been much success in the treatment of such cases with deep therapy Dr. Holmes thought that it might be possible to change the situation from a rather acute one into a chronic one by x-ray therapy. The patient was given between December 21, 1939, and July 11, 1940, 1550 r by the quadrant technic, which include the chest and the abdomen, once or twice weekly.

Then during the summer, following this treatment and fourteen transfusions, he had a remission. He had a happy summer and was well. The reason we stopped the x-ray treatment was that his blood was so low he had to have a transfusion once a week. We did not know exactly whether he got better because we stopped the x-ray or because he got delayed benefit from the x-ray therapy. Dr. Sprague saw him because of the electrocardiographic abnormality. He noted it in the laboratory and called me up to ascertain if this patient had pericarditis. I said that so far as I knew he had no pericarditis, but I asked Dr. Sprague to see him. We decided that he did not have it and went through the same process of thinking that Dr. Ludwig did in the question of whether he had some involvement of the heart or pericardium with tumor tissue. He was given x-ray treatment to the mediastinum—1000 r between December 3 and 17—on the basis that we might relieve some pressure that was interfering with the venous return; but to no avail. I refused to transfuse him further, and he died of a combination of anemia and cardiac failure.

Perhaps Dr. Holmes would like to say something more about the treatment.

DR HOLMES: As Dr. Breed said, our diagnosis was multiple myeloma. That in itself is not a very favorable type of disease to treat by radiation. It is usually a generalized disease, and the area that one has to treat is so large that it is almost impossible to accomplish anything. Furthermore, it is not a particularly sensitive tumor, but if this patient had myeloma, it was certainly an atypical form. There was no involvement of the bone, which is one of the characteristic findings in the usual case of myeloma. We assumed that if it was myeloma, it was a very rapidly developing, very active type and for that reason might be more sensitive to radiation than the ordinary case. We had had some experience with leukemia, using this method of dividing the body into four areas and giving one quadrant, once a week, a rather small dose, taking eight weeks to go over the whole body. We consequently thought we were justified in trying it on that basis. As Dr. Breed said, we did not know whether we were successful in changing it into a more chronic form. The patient certainly had a good summer for some reason or other. We considered the danger of destroying what little blood-forming organs he had too great to continue, and we stopped.

DR SPRAGUE: He entered with evidence of rapid enlargement of the heart, which could be checked against previous x-ray films. The electrocardiogram also could be checked against previous elec-

trocardiograms that Dr. Breed had, and showed definite change. The patient had a big, dilated heart with gallop rhythm and evidence of both right-sided and left-sided failure of relatively mild degree at first. Later he presented more evidence of right-sided failure. However, in a general myocardial process the right ventricle generally fails first because it is the weaker chamber. The electrocardiogram was consistent with pericardial involvement, not necessarily pericardial fluid, and there was no definite evidence of constrictive pericarditis. There was the factor of anemia to account for the dilatation, and I thought the best bet probably was an infiltration of the pericardium, and perhaps the myocardium, by the underlying process, plus the anemia.

DR BERNARD M. JACOBSON: The serum protein of 10.7 gm, and several subsequent determinations were done in my laboratory by the gravimetric method, and were always high.

I have never seen a bone marrow with so many immature plasma cell elements as this, suggesting something very acute or malignant. It is true that multiple myeloma is accompanied in many cases by spontaneous symptomatic remissions just as dramatic as the spontaneous remissions in pernicious anemia. It is impossible to explain them. Yet a patient may feel better despite the fact that the bone destruction seen by x-ray may be advancing all the time. One of the most difficult things for all of us to believe is that as many as 30 per cent of cases of myeloma, judging from a series of approximately 35 cases that we have studied, will have bones completely negative by x-ray study even at the time of death. One should certainly not hesitate to make a diagnosis of myeloma because the bones are normal.

CLINICAL DIAGNOSIS

Plasma-cell myeloma

DR. LUDWIG'S DIAGNOSES

Multiple myeloma

Cardiac failure.

Ruptured intervertebral disk?

ANATOMICAL DIAGNOSES

Plasma cell myeloma, diffuse
Probable reticulum cell sarcoma of the femoral marrow.

Pulmonary endarteritis

Cor pulmonale.

Adhesive pericarditis

Pulmonary edema.

Chronic passive congestion of liver, spleen and kidneys.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: I am sorry time is short, because I am sure we should all like to continue this discussion. The autopsy showed a considerably enlarged heart, weighing over 500 gm., and an adhesive pericarditis. The adhesions seemed relatively recent. They could be stripped away by blunt dissection for the most part, and there was none of the marked thickening that one sees in the pericarditis of Pick's disease. I personally found it hard to believe that the pericardium could have been responsible for the cardiac failure. We see this degree of adhesive pericarditis too frequently in patients without cardiac symptoms. The thing that impressed me at the time of autopsy was the dilatation of the right ventricle and especially the dilatation of the pulmonary conus. Despite its dilatation, the right ventricle measured 5 mm. in thickness. I therefore felt justified in making a gross diagnosis of cor pulmonale. The lungs were very large and extremely wet and edematous. Grossly we could not find any atheroma in the pulmonary arteries; microscopically, however, all the minute pulmonary arteries showed an obliterative endarteritis. I have little doubt that the immediate cardiac difficulty was a cor pulmonale, secondary to pulmonary endarteritis. When the endarteritis developed, I have no idea. It is conceivable that radiation might have been the cause, but the amount of x-ray treatment was hardly great enough to make that probable.

The liver was very much enlarged, weighing 2500 gm., and showed the most extreme grade of congestion, with hemorrhagic necrosis of at least three quarters of every lobule, only a few viable liver cells persisting at the periphery. The spleen was enlarged also by passive congestion. The kidneys together weighed 600 gm., mostly due to edema. There were no casts in the tubules and nothing to justify a diagnosis of so-called "myeloma kidneys." I should like to inject a word of caution regarding interpretation of puzzling findings in cases of myeloma by the assumption of extraosseous myelomatous infiltrations. They are of extreme rarity. We have never seen any of significant degree in this laboratory. Compensatory hematopoiesis would be a more likely cause of enlargement of liver or spleen.

The proof of a diagnosis of myeloma must come, of course, from examination of the bone marrow. The picture in this case was rather puzzling and raises many questions, which I cannot answer.

An abnormal number of plasma cells were present in most of the sections studied, but in none was the proportion greater than 10 to 15 per cent of the nucleated cells, whereas in the original bone-

marrow aspirations they made up 25 per cent. In the intervening period they had apparently decreased rather than increased. This may have been the result of the radiotherapy, and might be interpreted as evidence of success. On the other hand the patient's anemia after a temporary remission had grown more severe. I have always assumed that the mechanism of anemia in cases of myeloma was that of progressive replacement of the hematopoietic marrow by tumor cells, a myelophthisic anemia. Certainly that was not the case here. The normal marrow elements were not decreased in number although they did show some shift to the left in differentiation. Even the marrow fat was not greatly decreased in amount. I believe we must conclude that this patient had myeloma, but I do not believe that we can attribute his death directly to it.

A further puzzle was added by a section of the femoral marrow. This had been noted to be deep red on gross examination. Microscopically it appears neoplastic, but the cells are certainly not plasma cells or their derivatives. They appear for the most part to belong to the clasmotocytic group, though a very large proportion of them are multinucleated. I am in doubt how this should be classified but believe it falls closest to the reticulum-sarcoma group. We found no evidence of similar neoplasm in any of the other bones examined, but six bones do not constitute a very large proportion of the human skeleton, so that we really do not know how extensive it may have been.

CASE 27132

PRESENTATION OF CASE

A sixty-one-year-old business man complained of substernal pain.

The patient was perfectly well until three days before consulting his physician, when he was seized with a severe substernal pain, which radiated down both arms to the wrists, where it produced considerable pain. The attack lasted from thirty to sixty seconds, then subsided and the patient felt quite well again. Exactly similar pains occurred from five to ten times a day during the next three days before he sought advice. It was unrelated to effort and occurred with greatest intensity at about three o'clock in the morning, when it awakened the patient. He felt perfectly well between times, and there was no dyspnea, orthopnea or cough. The patient was a tense, highly strung and active business man.

The past and family histories were irrelevant. Physical examination was entirely negative, including the heart, which was not enlarged to per-

cussion. The sounds were regular and of fair quality, the rate 74, and there were no murmurs. The blood pressure was 130 systolic, 80 diastolic.

The patient remained in bed for the next three days, but the attacks did not decrease in number and remained unrelated to effort; the effectiveness of nitroglycerin could not be determined because of the short duration of the pain, but it did appear to abort a few of the longer attacks. He reported to his physician at the end of this time, and physical examination was again entirely negative. Examination of the urine and blood was negative, and a blood Hinton reaction was negative. An electrocardiographic recording was normal.

The patient continued to have these attacks. At midnight two weeks later he awoke with a severe agonizing substernal pain radiating to both wrists. His physician was summoned some five hours later, and it appeared that the patient had been sitting in a chair writhing in agony during this time. His skin was white, and he was obviously in extreme pain. Even then the only change in physical examination was a much poorer quality of heart sound; the blood pressure was 120 systolic, 80 diastolic, the pulse 70. One-half grain of morphine gave great relief, and the patient dropped off to sleep. Three hours later he became cyanotic and developed a cough, rales being heard throughout both lungs. Digitalization was started but the patient suddenly died fourteen hours after the onset of pain.

DIFFERENTIAL DIAGNOSIS

DR SYLVESTER MCGINN. This case is rather unique for these exercises in that there is not a single abnormal physical or laboratory finding to help in making the diagnosis. At least it emphasizes the importance of history in any cardiac examination. I presume the diagnosis could have been made about as well over a telephone as it could at the bedside. The syndrome of angina pectoris with some typical and atypical features runs through the entire history. We have a man who had apparently always been in good health and suddenly was overcome with an illness, which from the very beginning had the earmarks of being very serious and within three weeks caused sudden death, a death that from the nature of the symptoms might well have been anticipated.

Among the causes of sudden death in a man of his age, although there is nothing particularly in the record to indicate it, would be dissecting aneurysm. The pain in this case was not one to suggest it. The patient had neither back pain, abdominal pain nor pain in the legs. Furthermore, it is un-

usual to find dissecting aneurysm in a patient without hypertension. Pulmonary embolism could cause sudden death, but here we have a man suffering five to ten attacks a day for a period of weeks, and that does not sound like pulmonary embolism, nor did he have a pleuritic type of pain. Angina decubitus with a gradual and impending coronary occlusion seems to me to be the most likely diagnosis. The term "angina decubitus" means a very severe angina with attacks occurring even when the patient is at rest. Such cases are quite uncommon. We see them in syphilitic heart disease, but this man had a negative Hinton reaction. I have seen several cases with severe anemia associated with coronary sclerosis, but this man's blood study was negative. Some patients with aortic stenosis may have angina decubitus, but physical examination of the heart in this case was normal, so that I think we must rule out a valvular disturbance. In trying to reconstruct the case, it seems to me there was a small, partial coronary occlusion and finally the occlusion became complete either by dislodgment of an atheromatous plaque or a gradually increasing thrombosis. I assume that complete occlusion occurred at the final episode, when he died. Had it occurred prior to that time we should probably have found definite evidence of myocardial infarction, either in the physical findings or in the electrocardiogram that was reported. These negative findings would rule out myocardial rupture as the final cause of his demise. I should like to make a diagnosis of coronary sclerosis with coronary occlusion, and angina pectoris with an impending complete occlusion.

DR HOWARD B. SPRAGUE. Should you like to suggest that he had a process in the right coronary artery, because he had pain in the right arm?

DR MCGINN. Not with a normal electrocardiogram.

DR ALFRED KRANES. There are several points of interest in the story. The first is the suddenness and severity with which it started. The patient insisted that he had been quite well previously. Several months before he was seen, he had applied for a large insurance policy and had passed the physical examination successfully. That fact might, I suppose, make one slightly suspicious that the history might not be entirely accurate. At any rate, the insurance company feels that way about it. The second point is that the pain was not related to effort. He could run up a flight of stairs without any difficulty but had a good deal of pain lying quietly in bed at night. Finally the electrocardiogram taken ten days before his death was entirely normal. I am sorry I did not bring it with me.

DR SPRAGUE. A person, of course, can have a

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The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal
Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of
THE MASSACHUSETTS MEDICAL SOCIETY
and
THE NEW HAMPSHIRE MEDICAL SOCIETY

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SUBSCRIPTION TERMS: \$5.00 per year in advance, postage paid, for the United States, Canada, \$7.00 per year, Boston funds, \$8.52 per year for all foreign countries belonging to the Postal Union.

MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

NATIONAL CANCER MONTH

This year, with attention distracted by world turmoil, it is all the more necessary to have some specific event to focus interest, at least in passing, on cancer and its relation to human beings, since this problem—war or no war, emergency or no emergency—is always with us. Hence, it is appropriate that April has been set aside as National Cancer Month.

During the coming year it is to be hoped that the progress made in this field in previous years will continue. However, it is all too easy to forget that the problem is far from solved and that, in the need for airplanes, tanks and submarines, the less spectacular necessity for continued effort against cancer persists. The very fact that Massachusetts has in recent years been showing a fall-

ing death rate from this disease is all the more reason to intensify efforts to overcome it.

Year by year, advance in knowledge of the treatment not only of cancer itself but also of pre-cancerous conditions has increased, and there is now more than a glimmering of hope that a fair proportion of cutaneous cancers, and even some cancers of the uterine cervix, may be prevented by adequate care of certain types of premalignant lesions.

Additional experience in the field of high-voltage and super-voltage radiation therapy, the use of the new radio-active isotopes and the advances made in the field of thoracic surgery have provided further means by which various forms of cancer may be more successfully treated.

Education to permit the application of this therapy early in the development of a neoplastic process is an essential part of any effort to meet the problem. The willingness of the medical profession to aid in this educational work has been and must continue to be an important factor in reducing mortality from cancer.

THE TREATMENT OF THE PSYCHONEUROTIC

THE principal forms of treatment now in vogue for the psychoneurotic patient, evolved through centuries of experience, are the "psychobiological" approach, advocated and developed in America by Adolf Meyer, the "persuasive" method of Dubois and the "re-educational" form, exemplified by the work of the late Austen Fox Riggs and often spoken of as the "Stockbridge method." All these procedures have their adherents in the treatment of the largest group of patients seen in medical practice. Success is claimed for each one or for various combinations. Few analytic evaluations of the results have, however, been reported, and the importance or unimportance of any one method is vaguely delimited in the minds of most physicians. How would a group of patients treated by the Meyer method compare with a similar number under the guidance of the re-educational form of Riggs, or the persuasive method of Dubois? No one knows, since no such analyses have been made.

For one type of treatment, however, that of Riggs, data are now available.* Such reviews are needed of all "systems," for it is largely by analysis of the results that a rational conclusion can be drawn regarding the effectiveness of treatment.

The Stockbridge method is based on certain concepts of the psychoneuroses as understood by Riggs. A constitutional vulnerability was considered the basic etiologic factor, made up of two main components, "a marked imbalance of the instinctive drives and a high degree of hypersensitivity, deep-rooted characteristics which profoundly influence the quality and intensity of the individual's habitual responses and predispose him to psychoneurotic illness." The hypersensitive person, especially if subjected to early unfavorable environmental influences, tends to develop distorted values, impractical ideals and faulty attitudes and habits. Immaturity of thought and action is the commonest factor; inner struggles, discordant relations, anxiety, insecurity, distressing feelings and many other symptoms may result.

With such a basis for a psychoneurosis, the Stockbridge treatment consists, in brief, of an attempt to aid the patient in obtaining insight into the development of his disorder by means of a painstaking personality review—usually by straightforward discussion. After a fair measure of insight is obtained, rehabilitation is attempted by weighing the useful against the unsatisfactory patterns of response. Finally the patient is tested against a normal background by living with his fellow men in an unrestricted environment.

To evaluate the results of treatment, a statistical study has been made of more than a thousand patients treated at Stockbridge during a twenty-five-year period from 1910 through 1934. The data coded were based on case histories, and it should be noted that only 4 per cent of the histories were thought to be excellent, 10 per cent good, 50 per cent fair and 37 per cent meager. To this was added information received after discharge of the patient in 96 per cent of the cases. In the estimates of the level of adjustment reached

by all the patients, 34 per cent were described as good, 48 per cent fair, 14 per cent poor and 4 per cent unknown. Thus a third made a good recovery, and over four fifths a good or fair recovery. Considering the fact that the median length of the first visit to Stockbridge for women was only thirty-four days and for men only twenty-six days, although the total duration of treatment in the majority of cases, owing to return follow-up visits, was much longer, the results of therapy may be said to be good. The chief weakness of the survey, however, lies in the relatively poor case records, a fault that should be overcome in the future.

One cannot estimate the value of the Stockbridge method as compared with other methods of treatment, since no satisfactory standards have been set up by other clinics. A beginning has been made in the Stockbridge survey. It is expected that others will follow the excellent example set by Coon and Raymond.

MEDICAL EPONYM

HAYGARTH'S NODOSITIES

Haygarth's nodosities were described by John Haygarth (1740-1827), F.R.S. and F.R.S. (Edinburgh), in his book, *A Clinical History of Diseases* (Vol. II, p. 155; London, 1805). The section containing the following excerpt is called "A Clinical History of the Nodosity of the Joints."

In this disease the ends of the bones, the periosteum, capsules or ligaments, which form the joint, gradually increase. These nodes are not separate tumours, but feel as if they were an enlargement of the bones themselves. . . .

The Nodes appear most nearly to resemble Gout. Both of them are attended with pain and swelling of the joints: but they differ essentially in many distinguishable circumstances. . . .

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

COMMITTEE ON MEDICAL EDUCATION AND MEDICAL DIPLOMAS

The Council at its meeting May 21, 1940, directed the Committee on Medical Education and Medical Diplomas to submit to it changes in the by-laws relative to the method of admission of the graduates of unapproved medical schools to the Society. While engaged in this task the com-

*Coon, G. P., and Raymond, A. F.: *A Review of the Psychoneuroses at Stockbridge*. 299 pp. Stockbridge, Mass.: Austen Riggs Foundation, Inc., 1940.

mittee thought that certain other matters not directly in line with the above purpose, but more or less related to it, should be included in the changes to be submitted. Following are the report and recommendations as submitted to the Council at its meeting on February 5, 1941. It was decided at that meeting that the report should be printed in full with appropriate comments, so that the whole matter might be more carefully considered at a special meeting of the Council to be called for that purpose. Explanatory comments for which the chairman of the committee is solely responsible have been inserted after each suggested change in the by-laws.

* * *

For several years among the applicants for fellowship in the Society the number of graduates of medical institutions not on the list recognized by the Council has been increasing. At the present there are two groups of such graduates. One, and much the larger group, is composed chiefly of graduates of domestic institutions not recognized as medical schools by the American Medical Association. This group also includes a few American born graduates of foreign medical schools, who have studied abroad, usually because they were not accepted by any recognized domestic medical school. There are a few foreign-born, foreign educated physicians in this group who have migrated to this country, chiefly before 1937. The other group, much smaller than the first, is composed almost entirely of foreign-born graduates of foreign medical schools who are chiefly German and Jewish, but by no means exclusively either. Most of these physicians have migrated recently to this country primarily to escape political oppression. Almost without exception, they have had a good medical education and are of proved ability, often being older men of outstanding ability with international reputations.

The members of the Committee on Medical Education and Medical Diplomas are unanimous in believing that it is in the best interests of this Society to treat these two groups differently. The basis of this difference we believe should be whether or not an applicant has had an adequate medical education and enjoys a good professional reputation. With very few exceptions the members of the first group have had an inadequate education, those of the second an adequate one, and it is usually not difficult to distinguish between them. We believe that members of the first group should be admitted to membership only when there is ample positive proof that they can be regarded as truly desirable additions to the Society. At present, in

the absence of evidences of undesirability other than an inadequate medical education, they are assumed to be desirable. We cannot agree with this attitude. We believe the members of the second group should become members of the Society as soon as they have been long enough in this country to have created definite favorable opinion in the minds of colleagues whose judgment would be commonly considered valuable.

The committee has been unable under the present system to evaluate adequately the desirability for fellowship of the majority of candidates appearing before it. Repeated attempts to gather information about the prospective candidates from the officers and fellows of the district societies have usually failed. A typical situation is for an applicant who is a graduate of an unrecognized domestic school to appear before the members of the committee, who have never seen him before, but who must decide as to his desirability from his appearance, diploma, application blank and a sheaf of letters personally solicited from his medical acquaintances, who invariably say that the applicant "is a capable and conscientious practitioner of medicine" and that his practice is "ethical." Only rarely has the committee received what it regards as a confidential expression of honest intelligent opinion regarding an applicant and his work from colleagues who really know him. Part of the present functioning of the committee as dictated by the by-laws has become farcical in the minds of its members. A major change in this undesirable situation seems impossible under the present by-laws.

The Committee therefore recommends that the following changes be made in the by-laws:

1 The name of the committee be changed to the Committee on Medical Education. (*The Committee on Medical Diplomas was created in 1881 primarily to make a periodic revision of the list of medical schools recognized by the Council. The Committee on Medical Education was created in 1906 primarily to consider improvement of state laws regarding registration in medicine. The two committees were combined in 1913. The present chief function of the Committee on Medical Education and Medical Diplomas is to investigate the qualifications of applicants who are graduates of unrecognized schools. The change is recommended only in the interest of simplification.*)

2 Chapter I Section 1. In line 5 on page 9 delete the clause, that their names and addresses prior to their examination by the censors," (*This clause appears more appropriately elsewhere. See Recommendation 9.*)

3 In line 10 on page 9 omit the words, or college. (*It seems unnecessary now to use the terminology "medical school or college," though it once might have had some legal reason. The change is recommended only in the interest of simplification.*)

4. In line 14 on page 9 after "code of ethics of this Society;" insert "that they have made application according to the provisions of Chapter V, Section 2; that they have paid the examination fee of three dollars;". (*The ultimate responsibility of seeing that all new applicants comply with the various provisions for entrance into the Society should rest with the censors. Article 3 of the constitution of the Society reads in part as follows, "No person shall become a member of the Massachusetts Medical Society except upon examination by the censors of said society" The contents of these two clauses are discussed under Recommendations 9 and 8a respectively.*)

5. Chapter I, Section 6: In line 5 on page 10 substitute the word, "December," for "November." (*The date of the present fall censors' examination is the first Thursday in November. According to the new "time-table" set up under Recommendation 9 the first Thursday in December seems better, as otherwise the closing date for applications from graduates of unapproved schools falls too close to Labor Day, an admittedly poor date for district secretaries and applicants alike. No such change in the date of the spring examination is needed.*)

6. Chapter V, Section 1: Beginning at line 11 from bottom of page 16, delete the whole paragraph, "Diplomas from medical schools . . . to take an examination." (*The contents of this paragraph appear more appropriately elsewhere. See Recommendation 9. The only factual change is in the period of time.*)

7. In line 2 from bottom of page 16 substitute the word, "December," for "November." (*See Recommendation 5.*)

8. At the bottom of page 16 insert the following: (a) "A fee of three dollars shall be paid by an applicant for fellowship to the district secretary for deposit in the funds of the general Society before each examination or re-examination by the censors. (b) An applicant shall not be considered as possessing the requisite qualifications for fellowship unless approved by at least three censors. (c) An applicant failing two examinations shall be disqualified from again applying for fellowship until three years have elapsed from the date of the last application."

(a. *Examination by the censors of applicants for fellowship at present involves the applicant in no expense. The censors, however, are paid for their work, as provided for in Chapter V, Section 4, of the by-laws. In accordance with the usual custom of institutions of learning, learned societies and boards of registration in medicine everywhere it is felt that the Society should charge a fee for its examinations.*

b. *Unchanged.*

c. *If an applicant is not passed by the censors at two examinations, it is believed that some time should elapse before re-examination, so that an applicant may improve his qualifications and not appear at every examination with essentially unchanged qualifications.*)

9. Chapter V, Section 2: To read as follows:

(a) "An applicant for fellowship who is a graduate of a medical school recognized by the Council shall apply on a form furnished for the purpose to the secretary of the district in which he has legal residence, not later than March 1 for the May censors' examination or October 1 for the December censors' examination. (b) At this time the district secretary shall verify the applicant's diploma and shall deliver the application form to the Secretary of the Society not later than March 10 or October 10 respectively. (c) An applicant nonresident in Massachusetts shall apply to the secretary of the Suffolk

District Medical Society and shall be examined by the censors thereof. (d) Consideration of a late application shall be postponed until before the next succeeding examination. (e) The names of all such applicants, their addresses, medical schools, dates of graduation and the names and addresses of the various district secretaries shall be published in a list in the first number of the *New England Journal of Medicine* on or after April 1 or November 1. (f) Confidential communications regarding the qualifications of applicants for fellowship shall be requested of the fellows of the Society to be sent to the appropriate district secretary not later than April 15 or November 15.

(g) "An applicant for fellowship who is a graduate of a foreign medical school or a domestic medical school not on the list recognized by the Council or of a medical school no longer in existence, and who has practiced for a minimum of five years, shall apply for fellowship in like manner with the following exceptions and additions:

(h) "The application form must be submitted to the district secretary not later than February 15 or September 15. (i) At this time also the applicant must submit the name and address of a fellow of the Society who has agreed to act as his sponsor. (j) The sponsor's duty is to obtain from fellows of the Society who are acquainted with the applicant and his work, confidential written opinions regarding his qualifications for fellowship to be mailed directly to the district secretary not later than March 15 or October 15. (k) The application form of such an applicant shall be delivered by the district secretary to the Secretary of the Society not later than February 20 or September 20. (l) A list, similar to that of applicants who are graduates of recognized schools, but with the addition of names and addresses of sponsors shall be published in the first number of the *New England Journal of Medicine* on or after March 5 or October 5.

(m) "The president, secretary and supervising censor of the district society, sitting as a local board of membership, shall then gather such further information as is deemed necessary to determine whether an applicant is a capable and conscientious practitioner of medicine and possesses a good professional reputation among his colleagues. (n) Every candidate must be personally interviewed by this board.

(o) "The district secretary shall deliver to the chairman of the Committee on Medical Education a complete confidential file of all applications including correspondence, and the written recommendations of the local board with supporting reasons for advocating the acceptance or refusal of each applicant not later than April 1 or November 1. (p) The committee shall then determine whether or not each candidate shall be approved for examination by the censors, and shall notify the district secretary and each applicant of their decision not later than April 20 or November 20."

(a. *Provisions unchanged except for dates. The system of definite unchanging dates from year to year is utilized throughout except in the case of examination dates, rather than the present method of dating by giving the number of weeks before the examination. The present method has always caused confusion in the minds of district secretaries and applicants alike since the actual date differs each year. Dates are set so as to allow ample time for the district secretaries, the secretary of the Society, the editor of the Journal, the local boards of membership and the Committee on Medical Education to perform their duties prop-*

erly as well as to allow no misunderstanding in anyone's mind concerning the date by which certain duties should be finished. Anyone who has not been one of the above mentioned officers has difficulty in appreciating the importance of this point.

b. Transporting bulky framed diplomas to be shown to more than one official of the Society, as now accurs, is unnecessary. The Secretary of the Society has to verify and edit certain information on the application blanks before publication in the Journal.

c. Unchanged

d. Nothing is more troublesome to all the officials concerned than attempting to handle late applications, which now are submitted up to the very eve of the examination and which are always coupled with requests for special consideration.

e. Unchanged except as to dates

f. Occasionally unfavorable information of importance about an applicant exists. If it is withheld by an applicant's colleagues and an applicant is admitted to the Society, responsibility should rest on those who withheld the information. Such information when made available is always treated confidentially.

g. Unchanged in essentials

h. The difference in dates from those in a is due to the more numerous procedures required in the cases of graduates of unapproved schools.

i and j. Sponsorship of an applicant who is a graduate of an unapproved school is a new proposal. Previously the applicant always personally approached his colleagues and asked for written recommendations. This system produced recommendations some of which were retracted by their writers in separate communications, and other recommendations which were obviously written by fellows who were only casually acquainted with the applicant, and others which were refuted by other available information. It is hoped that the new system will alleviate the embarrassment of an applicant's personally asking for a recommendation from a fellow who does not feel he can honestly give it.

k. See b

l. Unchanged except as to dates

m. This change is the most fundamental of all those suggested. The Committee on Medical Education and Medical Diplomas has sensed for a long time how helpless it was in obtaining adequate information on which to determine the desirability of candidates for fellowship; this point has already been discussed more fully in the formal report. It is believed that a local board will be in every way better fitted to obtain this information than the central committee. The number of men on the board is small; they are already in positions of responsibility in their local society, and two of the three are already members of the board of censors, which eventually will examine those candidates finally approved. Further, it is very definitely felt that in the case of graduates of unrecognized schools the essential responsibility of whether or not they should be admitted to membership in the local society should lie with their own nearby colleagues, not with those farther afield. See Recommendation 11 c.

n. Unchanged, except that the interview shall be carried out by the local board rather than the central committee.

o and p. This provides that the central committee shall take the responsibility of seeing that an undue pressure has not been brought to bear on the local board

to recommend for approval an undesirable applicant, nor on the other hand has unwarranted local prejudice barred from approval a desirable applicant.)

10 Chapter V, Section 3. In line 4 on page 17 after the words, 'applicants for fellowship,' insert the clause 'they shall see that each applicant pays the examination fee.' (See Recommendation 8 a. This is inserted as it becomes a new duty for the district secretary.)

11 Chapter VII, Section 5. First two paragraphs to be changed to read as follows:

(a) "The Committee on Medical Education shall consist of five fellows. It shall consider all matters relating to medical education which may be referred to it by the Council." (b) It shall review the case of every applicant for fellowship who presents according to the provisions of Chapter V, Section 2, a diploma from a medical school not on the list recognized by the Council. (c) It shall have the power to approve for examination by the censors such an applicant, and all decisions of the committee thereon shall be final. (d) It shall revise the list of medical schools recognized by the Council whenever it appears necessary."

(a) Unchanged

b. Changed in accordance with 9 o and p

c. Unchanged

d. Changed in that previously the committee had to await direction by the Council to accomplish this duty. It is believed that this list should conform to that of the medical schools approved by the American Medical Association, which is changed from time to time. The present list dated 1934 needs sixteen changes to bring it into such conformity.)

A recent ruling by the President reversed the previous interpretation of the provisions of the by-laws regarding the application for readmission to the Society of a former fellow whose resignation had been requested by the Committee on Ethics and Discipline. Inasmuch as the individual in question was a graduate of an unrecognized school, it was ruled that he had to appear before the Committee on Medical Education and Medical Diplomas for approval, before being allowed to appear before the censors. Due to information requested from the chairman of the Committee on Ethics and Discipline, the Committee on Medical Education and Medical Diplomas disapproved the application. The latter committee, as a result of this case, believes that it should have no jurisdiction in such cases of readmission to the Society, and as a result studied the provisions of the by-laws regarding readmission. With the approval of the Committee on Ethics and Discipline and the Committee on Membership it recommends that the following changes be made in the by-laws:

12 Chapter I, Section 7. To read as follows: "The resignations of fellows whose assessments have been paid in full or remitted may, on recommendation of the Committee on Membership, be accepted by the Council and sent to the treasurer of the Society." (The sentence deal-

ing with readmission is deleted. The matter is now dealt with in Recommendation 14 a.)

13. Chapter 1, Section 8: Omit last paragraph, "Fellows who have been deprived . . . secretary of the general Society." (The sentences dealing with restoration to fellowship are deleted. The matter is now dealt with in Recommendations 14 a, b, c, d, and e.)

14. Chapter I: Add Section 10, to read as follows:

(a) "Former fellows who desire to be readmitted to the Society shall make application in writing addressed to the Council and sent to the secretary of the Society. (b) Such applications shall be referred for investigation and personal interview to the local boards of membership, which shall report their recommendations to the Committee on Membership. (c) The committee shall render the final decision as to whether to recommend to the Council the readmission of former fellows. (d) The Council shall have the power to readmit former fellows so recommended. (e) Boards having under consideration the applications of fellows whose resignations have been requested by the Committee on Ethics and Discipline, or who have been deprived of fellowship under the terms of section 8, clause (c), shall consult with the Committee on Ethics and Discipline before reporting their recommendations."

(a and b. The distinction formerly made in Chapter 1, Sections 7 and 8, between the method used in readmitting to fellowship those fellows who having "resigned" and those who having been "deprived of the privileges of fellowship" desire to rejoin the Society has been eliminated. It is believed that the local boards of membership can more adequately investigate the facts surrounding a fellow's separation from the Society and the altered situation that leads him to seek readmission than can either the censors or a specially appointed committee, as is the practice at the present.

c. The Committee on Membership should retain jurisdiction to review the recommendations of the local boards as it does at present in all cases of deprivation of fellowship. At the present it has no jurisdiction in cases of readmission to the Society following resignation.

d. The Council should have the full power of readmission of all former fellows recommended by the Committee on Membership. At present it has no jurisdiction in cases of readmission to the Society following resignation.

e. At present in cases where the Committee on Ethics and Discipline has requested a fellow's resignation as a form of discipline, and such resignation has been received, and the fellow later reapplies for readmission, the Committee on Ethics and Discipline has no jurisdiction in the matter of readmission. If the fellow in question is a graduate of an unrecognized school he must appear at present before the members of the Committee on Medical Education and Medical Diplomas, who if they approve his application pass him on to the censors for examination. This procedure is most illogical, since those who know nothing about the fellow deal with his readmission, while those who know everything about him have no official hand in the matter. At present the Council acting on separate reports of the Committee on Ethics and Discipline and of the Committee on Membership may deprive a fellow of the privileges of fellowship as provided in Chapter 1, Section 8 (c). With such a fellow desiring restoration to fellowship, a special committee is appointed to consider his case, and the by-laws provide that this committee must include at least one member of the Committee on Ethics and Discipline. The latter committee believes that

with the institution of local boards of membership consultation with the Committee on Ethics and Discipline will provide sufficient opportunity for the board to know all the facts in the case before reporting its recommendations.)

JOHN P. MONKS, Chairman

* * *

For comparison, the by-laws referred to above are printed as they now stand:

CHAPTER I

FELLOWSHIP

Section 1. Applicants for admission to fellowship in the Massachusetts Medical Society are required to satisfy the censors that they are not less than twenty-one years of age; that they are of sound mind and of good moral character; that they possess a good English education that their names and addresses and the name and address of the secretary of the district society in which they reside have been published in a special list in the *New England Journal of Medicine* at least two weeks prior to their examination by the censors; that they have received a diploma from a medical school or college recognized by the Council, or that they have, in each instance, received the approval of the Committee on Medical Education and Medical Diplomas; that they do not practice medicine in a manner contrary to the code of ethics of this Society and they shall appear personally before the censors and satisfy them that the above requirements are fulfilled.

Section 6. Fellows shall be assessed annually such sum as the Council may determine. The fiscal year shall begin on the first day of January. Assessments shall be payable in advance. The first assessment paid by a fellow admitted to the Society following the November examinations shall cover his dues for the succeeding fiscal year and shall be the amount fixed for that year.

Assessments may be remitted by the Council on recommendation by the Committee on Membership.

Whenever a fellow owing more than one annual assessment pays for one year or more, the payment or payments so made shall be considered as for the assessment or assessments longest due, and for no others.

Section 7. The resignations of fellows whose assessments have been paid in full, or remitted, may, on recommendation of the Committee on Membership, be accepted by the Council. Should such fellows apply for readmission, they shall appear personally before the censors and the censors shall satisfy themselves that such applicants still meet the requirements of sections 1 and 2 of chapter I. Petitions to be allowed to resign should be addressed to the Council and sent to the Treasurer of the general Society.

Section 8. (a) Resident fellows who have neglected payment of three annual assessments, and who continue to neglect payment after notification by the Treasurer shall be deprived of the privileges of fellowship, unless otherwise ordered, by the Council acting on a report of the Committee on Membership.

(b) Non-resident fellows who have neglected payment of two annual assessments, after removal from the state shall be deprived of the privileges of fellowship in the same manner.

(c) Fellows who have been convicted in a court of law of a crime or misdemeanor involving moral turpitude or

who have been deprived of license to practice medicine in the Commonwealth, may be deprived of the privileges of fellowship by the Council acting on separate reports of the Committee on Ethics and Discipline and of the Committee on Membership, presented by the latter committee. Before a fellow shall be so recommended for deprivation, he shall have the privilege, if he requests it in writing, of a hearing by the joint committee.

Fellows who have been deprived of the privileges of fellowship and desire restoration shall make application in writing to the Council. Such application shall be referred to a committee for investigation and report. A committee having under consideration the application of a fellow deprived of the privileges of fellowship under the terms of clause (c) shall include in its membership at least one member of the Committee on Ethics and Discipline. All applications shall be addressed to the Council and sent to the Secretary of the general Society.

CHAPTER V

CENSORS AND SUPERVISORS

Section 1 The supervisors, representing the censors of the several district societies, shall constitute a board, which shall meet annually on the day appointed for the annual meeting of the Council. The board shall elect a chairman, who shall have power to call special meetings. Five supervisors shall constitute a quorum. The Secretary of the general Society shall act as secretary of the board. He shall call special meetings at the request of five supervisors. He shall keep a permanent record of the proceedings of the board, and shall provide, at the expense of the Society, papers and forms necessary for conducting examinations of applicants for fellowship. The board at its annual meeting shall adopt a uniform plan for the examination of applicants. The supervisors shall be paid the amount of their traveling expenses from the funds of the Society.

The supervisors shall be chairmen of their respective boards of censors, and shall cause the examinations of applicants to be conducted in strict conformity to the plan adopted by the Board of Supervisors.

Diplomas from medical schools and colleges no longer in existence, and diplomas from all foreign and domestic medical schools which are not on the list of medical schools and colleges recognized by the Council, shall be referred to the Committee on Medical Education and Medical Diplomas by the district secretary three weeks before an applicant shall be permitted to take an examination.

The censors of the several district societies shall meet semi-annually for the examination of applicants on the first Thursday in May and on the first Thursday in November. Special meetings may be held by order of the Council.

Section 2 An applicant for fellowship who is a graduate of a medical school or college recognized by the Council, shall apply, on a form furnished for the purpose to the secretary of the district in which he has a legal residence, at least six weeks before the date of a given examination. Applicants who are graduates from medical schools or colleges not upon the list recognized by the Council, shall apply not later than eight weeks before the time of a given examination. An applicant non-resident in Massachusetts shall apply to the secretary of the Suffolk District Medical Society, and shall be examined by the censors thereof. An applicant shall not be considered as possessing the requisite qualifications for fellowship unless approved by at least three censors.

Section 3 District secretaries, who shall act also as secretaries of their respective boards of censors, shall furnish applicants with forms adopted by the Board of Supervisors, they shall keep a complete record of all applicants for fellowship, they shall see that each successful applicant subscribes to the bylaws and code of ethics and pays within two weeks the dues for the current year, they shall furnish each new fellow with a copy of the digest, by laws, code of ethics, and Medical Defense Act of the Society, and they shall present promptly after each examination, to the Treasurer of the general Society on a blank form furnished by him, a bill for censors' services together with a list of all the applicants examined. (See also chapter III, section 7.)

Following the examination of applicants, the district secretaries shall fill out, sign, and forward promptly to the Secretary of the general Society certificates stating that the successful applicants have complied with the requirements of the bylaws.

CHAPTER VII

Section 5 The Committee on Medical Education and Medical Diplomas shall consist of five fellows. It shall consider all matters relating to medical education which may be referred to it by the Council. When directed by the Council it shall revise the list of medical schools and colleges recognized by that body. Questions as to diplomas, referred to the censors under the provisions of chapter V, section 1, shall receive consideration and the decisions of the committee thereon shall be final.

It shall have power to recognize a medical diploma from a foreign medical school or college or from a domestic school or college not on the list recognized by the Council, when such a diploma is presented by an applicant who has practiced for a minimum of five years, offers proof to the committee that he is a capable and conscientious practitioner of medicine, and is recommended in confidential communications by a number of his colleagues who are fellows of the Society. The medical diploma and written recommendations of colleagues shall be sent by the district secretary to the chairman of the committee at least three weeks before any given examination. The committee shall interview personally all such applicants for fellowship.

It shall make a report to the annual meeting of the Council. On or before the fifteenth of January annually, it shall forward to the chairman of the Committee on Financial Planning and Budget an estimate of the expenses for the current year. All bills incurred shall be countersigned by the chairman and forwarded to the President for his approval.

COMMITTEE TO CONSIDER NEW OFFICERS AND BY-LAWS

Following the Council meeting of October 2, 1940, a committee was appointed by the president of the Massachusetts Medical Society to study the desirability of establishing the offices of president-elect and full-time or executive secretary and to suggest the necessary changes in the bylaws required to create these positions. At the Council meeting of February 5, 1941, the bylaws dealing with the creation of the office of president-elect

were accepted. At the same meeting the plan of having an executive secretary was accepted in principle, but the manner of electing the executive secretary was left to be determined.

At the Council meeting of October 2, 1940, a motion was made that this same committee should study the possibility of redistricting the Massachusetts Medical Society, with the idea of harmonizing its set-up with that of the American Medical Association and other state societies. The committee, in reporting at the Council meeting of February 5, 1941, took no action in respect to the problem of redistricting, but did suggest certain by-laws by which an executive committee of the Council could be established. In respect to the latter, the Council voted "that the committee continue and that it explore the possibilities of an executive committee so constituted that each district medical society would be represented."

Hence, your chairman has circularized the secretaries of the different district societies, asking them to secure, if possible, in the brief time between Council meetings, an opinion from their respective districts as to the best method of selecting an executive committee of the Council, and the possibility of redistricting the Massachusetts Medical Society.

In one way or another, your chairman has heard from six secretaries and from various sources has received the following impression: that no district desires a change in its boundaries and that a majority of the districts are opposed to such a change; that the idea of an executive committee of the Council is generally acceptable and that the districts prefer that each of them should be represented on this committee, no others to be made members of the committee except the officers of the Society. In accordance with this understanding, your committee, after consulting together, suggests the following changes in the by-laws.

JOHN HOMANS, *Chairman*,
JOHN FALLON,
PEIRCE H. LEAVITT,
FRANK R. OBER,
WALTER G. PHIPPEN, *ex officio*,
AUGUSTUS THORNDIKE, JR.

CHAPTER III DISTRICT SOCIETIES

Section 5. (Additional)

The councilors of each district society shall meet immediately after the annual meeting of the district society in 1941 and elect one of their number to serve as a member of the Executive Committee of the Council in accordance with Chapter IV, Section 10. Thereafter, in a similar manner, they shall elect a new member from time to time.

Section 7. (Additional)

The secretary of each district society immediately after the annual meeting of the district society in 1941 shall call together its councilors for the purpose of electing a member of the Executive Committee of the Council and shall send the name of the member chosen to the Secretary of the general Society. He shall see that a new member is chosen in a similar manner to fill a vacancy as it occurs, in accordance with Chapter IV, Section 10.

CHAPTER IV

THE COUNCIL

Section 10. The Executive Committee shall consist of the President, President-Elect, Vice-President, Secretary and Treasurer *ex officio*, and a councilor from each district medical society chosen in accordance with Chapter III, Section 5. The election of a councilor to the Executive Committee of the Council shall not be considered as leaving a vacancy among the councilors from the district he represents.

The councilors of each district society shall meet immediately after its annual meeting in 1941, as specified in Chapter III, Section 5, and in a similar manner at stated intervals as specified below, to choose one of their number to serve as a member of the Executive Committee of the Council.

A member of the Executive Committee shall serve for three years and shall not be eligible for re-election before the expiration of three years following the conclusion of his term of office; except that in 1941 six members shall be selected by lot to serve one year, six members shall be selected by lot to serve two years and six members shall be selected by lot to serve three years. Thereafter, six members shall be elected every year to succeed in office those whose terms are about to expire.

The Executive Committee shall meet at the call of the President at least once in each interval between Council meetings and may meet more often at the pleasure of the President. It shall assist the President in preparing for the consideration of the Council matters calling for action by the Council at its next meeting. It shall authorize action by the officers of the Society when circumstances require it, subject to the approval of the Council. It shall perform such other duties as the Council may require.

The consent of the Executive Committee shall be required to confirm the appointment, upon nomination by the President, of the Executive Secretary of the Society.

Upon request, members of the Executive Committee shall be paid the amount of their traveling expenses from the funds of the Society.

CHAPTER V

CENSORS AND SUPERVISORS

Section 1. The supervisors, representing the censors of the several district societies, shall constitute a board, which shall meet annually on the day appointed for the annual meeting of the Council. The board shall elect a chairman, who shall have power to call special meetings. Five supervisors shall constitute a quorum. The Secretary or Executive Secretary of the general Society shall act as secretary of the board. He shall call special meetings at the request of five supervisors. He shall keep a permanent record of the proceedings of the board, and shall provide, at the expense of the Society, papers and forms necessary for conducting examinations of applicants for fellowship. The board at its annual meeting shall adopt a uniform plan for the examination of applicants. The

supervisors shall be paid the amount of their traveling expenses from the funds of the Society

CHAPTER VI

OFFICERS

Section 1 (Additional)

He shall call at least one meeting of the Executive Committee of the Council between Council meetings and may call more meetings if he so desires

Section 4 The Secretary may assign to an Executive Secretary any or all the duties now to be enumerated, except as specified below

The Secretary shall attend all meetings of the Society and of the Council, and shall record their respective proceedings in separate record books, and this duty he may not assign

He shall cause to be engrossed and shall sign the diplomas of new fellows if satisfied that they have met the requirements of Sections 1 and 2 of Chapter I, and shall issue all diplomas and certificates of fellowship. He shall notify individual fellows, in appropriate instances, of votes by the Council granting permission, as the case may be, to retire, to resign, to change district membership, to have dues remitted, or of votes depriving them of the privileges of fellowship, and these duties he may not assign

He shall act *ex officio* as secretary of all boards of trial, and this duty he may not assign

He shall have custody of the seal of the Society and of all books, papers, manuscripts, prints and paintings belonging to the Society, except such as are in charge of the Treasurer, and this duty he may not assign

He shall act *ex officio* as secretary of the Board of Supervisors and of the Committee on Publications and the Committee on Ethics and Discipline, and shall keep the records of each in a separate volume. He shall have custody of all records as thus kept.

He shall issue notices of the meetings of the Council One month before the annual meeting of the Society, he shall issue to every fellow a program, which shall contain notification of the time and place of the annual meeting, notification of the stated meetings of the Council for the year and the meetings of the boards of censors, and information concerning the payment of assessments and the distribution of publications

He shall record the Proceedings of the Council and of the Society. He shall keep a complete list of the fellows of the Society, with their addresses so far as known. He shall transfer fellows from one district to another under the terms of Chapter III, Section 2, and shall report to the Society at its annual meeting the changes in membership of the Society during the year

He shall conduct the official correspondence of the Society, and shall notify officers, delegates and members of the committees of the general Society of their appointments and of their duties

Under the direction of the Committee on Publications he shall issue at such intervals as may be determined by the Council a directory of officers and fellows of the Society, which shall be furnished upon request to fellows who are not in arrears

He shall perform such other duties as the Society or the Council may require

Section 5 An Executive Secretary shall be chosen by the Executive Committee of the Council upon nomination by the President. He shall hold office until his successor has been duly elected

He shall perform such duties as are assigned to him

in Section 4 of this chapter and by the Executive Committee. In general, he shall assist the officers of the Society and such standing and other committees as may request his services, and the Society shall have the first call upon his services

He shall attend all meetings of the Council and, on request, attend the meetings of the Executive Committee of the Council, but shall not vote in either

An Executive Secretary need not be a physician

COMMITTEE ON STATE AND NATIONAL LEGISLATION

The following bills are scheduled for hearings at the State House during the week of March 31

April 3

H 1223 (Public Health) Petition of the Massachusetts Central Health Council and another for legislation to authorize the treatment of spastic paralysis at the Lakeville State Sanatorium. The committee believes that the Lakeville State Sanatorium is intended only for cases of nonpulmonary tuberculosis. *Opposed*

H 869 (Public Health) Petition of Enrico Cappucci and Lawrence P. McHugh for the suspension of the license of physicians who fail to make public their insurance company connections. This bill requires further investigation. *Undecided*

H 2007 (Public Health) Petition of Catherine E. Falvey for the establishment of a bureau for the care of inebriates under the Department of Public Health and relative to the powers and duties of such bureau. *Undecided*

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., Secretary
330 Dartmouth Street
Boston

PERNICIOUS VOMITING IN PREGNANCY WITH FATAL OUTCOME

A thirty three year-old essential multipara in her fourth pregnancy was first seen when she was about ten weeks pregnant. She had been vomiting for two or three weeks before she consulted the doctor, and she was treated at home for two weeks before hospitalization.

The three previous pregnancies had resulted in a miscarriage at about eleven weeks, a spontaneous delivery at five months and a spontaneous delivery at six months. She had had no serious illness.

At the first examination the heart was not enlarged; there were no murmurs. The lungs were clear and resonant, there were no rales. The abdomen was negative except for a uterus that was enlarged to a size consistent with the period of amenorrhea. A blood Wassermann reaction was negative. The patient complained of vomiting of two to three weeks' duration.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

After a period of two weeks of inadequate medical treatment at home, the patient was sent to the hospital. On admission she was dehydrated. The tongue was dry and coated. The blood pressure was normal. The uterus was enlarged and in a normal anterior position.

For twelve days the patient was treated intensively with intravenous glucose, sedation and gastric feedings. On the thirteenth day after admission, she developed cerebral symptoms. On investigation by a consultant these were diagnosed as cerebral edema. The condition did not improve, and the patient died without operation on the twenty-fifth day after hospitalization.

Autopsy revealed a three months' pregnancy; nephrosis; acute venous congestion of the lungs and spleen with hemorrhage; edema of the brain, optic nerve and retinas; strangulation of the appendices epiploicae (torsion of pedicle); petechial hemorrhages in the epicardium and the mucosa of the stomach.

Comment. It is interesting in reviewing this history to note that the patient had three previous pregnancies but no living children. It is perfectly possible that the two pregnancies that ended spontaneously at five and six months respectively may have been induced by an underlying malnutrition. It is uncommon for patients exhibiting severe symptoms from vomiting in early pregnancy not to respond to intravenous glucose, sedation, gastric feedings and concentrated intramuscular injections of vitamin B. The unusual patient under this treatment continues to vomit and lose weight, shows increasingly rapid pulse and may develop jaundice. These symptoms demand medically that the uterus be emptied. Fortunately, therapeutic abortion for pernicious vomiting of pregnancy is extremely uncommon when the patients are treated adequately.

REFUND DISTRIBUTION

The Treasurer of the Massachusetts Medical Society makes the following report regarding the refund to district societies for 1941.

The Council voted to distribute the sum of \$4000 to district societies. The total number of payments of annual dues received by the Treasurer by March 4, to be counted for the refund, was, 4038. Therefore the refund to the district societies for each paid fellow is \$0.99.

The following table gives the number of payments in, and the refund to, each district as of March 18:

DISTRICT	NUMBER REPORTED PAID	REFUND
Barnstable	36	\$36.12
Berkshire	109	107.91
Bristol North.....	65	64.83
Bristol South.....	158	156.42
Essex North	172	170.28
Essex South	242	239.58
Franklin	40	40.08
Hampden	299	296.01
Hampshire	50	49.98
Middlesex East	114	112.86
Middlesex North	103	101.97
Middlesex South	762	754.38
Norfolk	703	695.97
Norfolk South.....	120	118.80
Plymouth	117	115.83
Suffolk	521	515.79
Worcester	344	340.56
Worcester North.....	83	82.63
	4038	\$4000.00

In 1940, for comparison, the total number of payments for the refund was 4058.

CHARLES S. BUTLER, M.D., *Treasurer.*

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning March 30:

BERKSHIRE

Thursday, April 3, at 4:30 p.m., in the Bishop Memorial Building, Pittsfield. Diagnosis, Treatment and Prognosis of Central-Nervous-System Syphilis. Instructor: Francis M. Thurmon. Harry G. Mellen, *Chairman.*

BRISTOL SOUTH (Fall River Section)

Tuesday, April 1, at 4:30 p.m., at the Union Hospital, Fall River. Acute Abdominal Pain: Its interpretation and management. Instructor: Richard B. Cattell. Howard P. Sawyer, *Chairman.*

FRANKLIN

Thursday, April 3, at 8:00 p.m., in the Library of the Franklin County Public Hospital, Greenfield. Recent Advances in Medical Therapeutics. Instructor: Charles L. Short. Halbert G. Stetson, *Chairman.*

HAMPDEN

Wednesday, April 2, at 4:00 p.m., at the Academy of Medicine, Professional Building, 20 Maple Street, Springfield, and at 8:00 p.m., in the Out-patient Department of the Skinner Clinic, Holyoke Hospital, Holyoke. Dermatitis and Eczema. Instructor: John G. Downing. Alfonso A. Palermo, *Chairman.*

PSHIRE

Thursday, April 3, at 4 15 p.m., in the Nurses' Home of the Cooley Dickinson Hospital, Northampton Pediatric Case Discussions Instructor James M Baty Robert C Byrne *Chairman*

ESTER

Tuesday, April 1, at 8 30 p.m., in the Nurses' Home of the Milford Hospital, Milford Therapeutic Uses of Preparations of Endocrine Glands Thyroid gland, pituitary gland, ovary, testis and adrenal cortex Instructor William T Salter Joseph Ashkins, *Chairman*

ESTER NORTH

Friday, April 4, at 4 30 p.m., in the Nurses' Home of the Burbank Hospital, Fitchburg The Treatment of Varicose Veins Instructor F Everett O'Neil George P Keaveny, *Chairman*

TH

ASON—GILBERT McC MASON, MD, of Dorches died March 17 He was in his seventieth year When in Clinton, he attended Cushing Academy and received his degree from Boston University School of Medicine in 1898 From 1901 to 1910 he was demonstrator in anatomy at Boston University School of Medicine and also served on the staffs of the Carney and Forest hospitals. Dr Mason was a fellow of the Massachusetts Medical Society and the American Medical Association, as well as a member of the Association of Military Surgeons and the American Institute of Homeopathy He was a widower, a daughter, two brothers and two sisters survive him

CELLANY

NE NEWS

RECENTLY REGISTERED PHYSICIANS

The following physicians were recently licensed to practice medicine in Maine

THROUGH EXAMINATION, JULY, 1940

Don D Blake, Jr., Waterville
Arnon Bobrow, Hartford, Connecticut
William E Browne, Boston, Massachusetts
Charles R. Geer, Portland
Donald F Larkin, Waterville
Louis C LeSieur, Biddeford
Harry M Lowd, Swampscott, Massachusetts
Alexander D Milligan, Hartford, Connecticut
Edward G Miragliuolo, Providence Rhode Island
John F Reynolds, Waterville.
Abraham E Rosen, Bangor
Lason Trowbridge, Upper Montclair, New Jersey
Earl H Turner, Edmundston, New Brunswick

THROUGH EXAMINATION, NOVEMBER, 1940

Thomas J Fritchey, Harrisburg, Pennsylvania
Eugene G Gormley, Houlton
Earl V Larson, Bangor
Walter D Mazzacane, New Haven, Connecticut
John D Prior, Hartford, Connecticut
May A Proctor, Boothbay Harbor

THROUGH RECIPROCITY

Harvey F Doe, Trenton, New Jersey
Charles L Holt, Portland
Edward F Rohmer, Astoria, Long Island
Deering G Smith, Nashua New Hampshire
Victor L Szanton, Deer Island, Maryland
Robert A Frost, Lewiston
Donald Macomber, North Quincy, Massachusetts
Ralf Martin, South Freeport.
Arthur P Stebbins, Bangor

NEW ASSOCIATION MEMBERS

The following physicians have been recently admitted to membership in the Maine Medical Association

Paul V Davis, Bridgton
C Lawrence Holt, Portland
Kenneth E Smith, Portland.
Victor L. Szanton, Bridgton
Reynold A E Ulpts, Portland.
William W Hardman, Togus
Laverne Harris, Richmond.
Helen C Provost, Augusta
Chester W Malmstead, Bangor
Arthur P Stebbins, Bangor
Adelbert B Allen, Corinna
George C Howard, Guilford
John T Guy, Ellior

NOTES

Dr Elkhott P Joslin was the speaker at the meeting of the Osler Clinical Society of the University of Vermont College of Medicine on Wednesday evening, March 12 The subject of Dr Joslin's lecture was 'The Application of Recent Physiological Studies to the Treatment of Diabetes Mellitus'

Harvard University recently announced the appointment of Dr William C Quinby as clinical professor of genitourinary surgery, emeritus and Dr Irving J Walker as clinical professor of surgery, emeritus, on the faculty of Harvard Medical School to become effective September 1

CORRESPONDENCE

MEDICAL CONTRACEPTIVE CARE

To the Editor The public hearing on House 2035, the Massachusetts initiative petition for 'an act to allow physicians to provide medical contraceptive care to married persons for the protection of life or health, will be held before the Committee on Public Health of the Legislature at 10 30 a.m., Thursday, April 3, in the Gardner Auditorium, State House, Boston

The petition, which was initiated by ten prominent citizens of Massachusetts, including Drs Nathaniel W Faxon, of Newton, Frederick C Irving of Brookline, John C Rock, of Boston, and Curtis C Tripp, of New Bedford, was filed with 44,565 certified signatures of registered Massachusetts voters more than double the 20,000 signatures required by law

The petition is supported by the Committee for the Defense of Medical Rights, which reports that a majority of active members of the Massachusetts Medical Society have signed statements in support of the principle that physicians should be exempted from the restrictions of the present law

Adoption by the Legislature of the proposed act would amend Chapter 272 of the General Laws by adding at the end of Section 21, the following:

The provisions of this section and of section twenty which relate to the prevention of pregnancy and the prevention of conception shall not apply to treatment or prescription given to married persons for protection of life or health by or under the direction of physicians registered in accordance with the provisions of Chapter 112; nor to teaching in chartered medical schools; nor to publication or sale of medical treatises or journals.

Only Massachusetts and Connecticut have laws that have been enforced in such a way as to interfere with the right of a physician to prescribe contraceptives to a married woman for health reasons. Three states—North Carolina, South Carolina and Alabama—have incorporated postnatal contraceptive care into their maternal-health programs under the direction of their respective state medical societies.

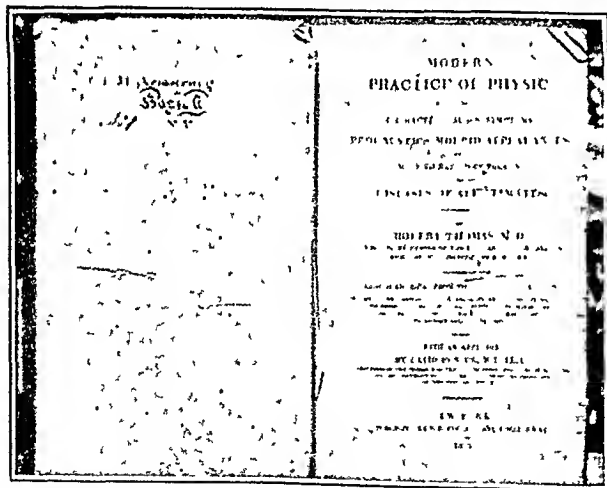
WILLIAM H. ROBEY, M.D., *President*,
Committee for the Defense of Medical Rights.

270 Commonwealth Avenue,
Boston.

DR. P. M. ARMSTRONG,
OF HOOSICK, NEW YORK

To the Editor: A rather peculiar incident occurred to me recently. I was reading the June, 1939, issue of *Digest of Treatment* and noted a "Tombstone Inscription in Hoosick, N. Y." taken from the *New England Journal of Medicine*.

At first the name Dr. P. M. Armstrong did not register, but later I remembered that about fifteen years ago



a Mr. Armstrong gave me an old volume which had been his grandfather's and had been kept in the family for many years. This volume, *The Modern Practice of Physic*, by Robert Thomas, published in New York in 1825 by S. B. Collins, and Collins and Company, and marked number one volume from the library of P. M. Armstrong, of Hoosick, New York, evidently belonged to the person referred to in the inscription.

ARTHUR H. STOLL, M.D.

329 North Fifth Street,
Oxnard, California.

The tombstone inscription referred to above is as follows:

RUTH SPRAGUE

dau. of Gibson
& Elizabeth Sprague,
died Jan. 11, 1846; aged
9 years 4 mo's & 3 days.

She was stolen from the grave
by Roderick R. Clow & dissected
at Dr. P. M. Armstrong's office
in Hoosick N. Y. from which place
her mutilated remains were
obtained & deposited here.

Her body dissected by fiendish Men
Her bones anatomised,
Her soul we trust has risen to God,
Where few Physicians rise.

It was contained in a letter, "Body Snatching," submitted by Dr. Edward F. Timmins, of South Boston, and published in the March 16, 1939, issue of the *Journal*. Ed.

RESTORATION OF LICENSE

To the Editor: At the meeting of the Board of Registration in Medicine held March 13, there was restored to Dr. Michael Litvich, 114 Shirley Avenue, Revere, Massachusetts, his license, which had been revoked on December 19, 1940.

STEPHEN RUSHMORE, M.D., *Secretary*,
Board of Registration in Medicine

State House,
Boston.

REVOCATION OF LICENSE

To the Editor: The license of Dr. Claude G. Shepherd, formerly of 84 Humboldt Avenue, Roxbury, Massachusetts, was revoked by the Board of Registration in Medicine on March 13 because of violation of the law concerning narcotic drugs.

STEPHEN RUSHMORE, M.D., *Secretary*,
Board of Registration in Medicine

State House,
Boston.

NOTICES

MEDICAL AND SURGICAL SUPPLY COMMITTEE

It will help England greatly in the care of victims of bombing raids and help England prepare for the coming invasion, if physicians in this country will give discarded or superfluous surgical instruments or surgical dressings.

Any such material should be sent to the Medical and Surgical Supply Committee, 420 Lexington Avenue, New York City.

HARVARD MEDICAL SOCIETY

The next meeting of the Harvard Medical Society will be held in the Peter Bent Brigham Hospital amphitheater on Tuesday, April 8, at 8:15 p.m.

PROGRAM

Presentation of cases.
Disabilities in Reading and Their Remedying. Professor Walter F. Dearborn, Harvard University.

JOSEPH H PRATT DIAGNOSTIC HOSPITAL

Bennet Street, Boston
Lecture Hall, 9-10 a m

MEDICAL CONFERENCE PROGRAM, APRIL

- Tuesday, April 1—Cell Respiration Dr W Gleim
Thursday, April 3—Vitamin B Deficiency (motion picture film)
Friday, April 4—Mental Changes in Paget's Disease Dr R C Wadsworth
Tuesday, April 8—Pancytopenia Drs William Damshek and E B Miller
Thursday, April 10—The Problem of Vasomotor Rhinitis Dr L R Weiss
Friday, April 11—Certain Aspects in the Diagnosis and Treatment of Contagious Diseases Dr E H Place
Tuesday, April 15—Medical Ophthalmology Dr S T Clarke
Thursday, April 17—Endocrinological Relation between the Hypophysis and the Eye Problems and facts Dr J Igersheimer
Friday, April 18—What Happens to Alcoholics Dr Merrill Moore
Tuesday, April 29—Sir Charles Bell in Modern Dress Dr Leonard Carmichael

Morning conferences will be suspended for the week of April 21, during the meetings of the American College of Physicians

On Wednesday and Saturday mornings throughout the month Dr S J Thannhauser will give a medical clinic on hospital patients

BOSTON SOCIETY OF BIOLOGISTS

There will be a meeting of the Boston Society of Biologists at the Harvard Medical School Amphitheater E, on Wednesday, April 30, at 8 p m

PROGRAM

- Chemical Conjugation of Antibodies without Destruction of Their Function Dr Alvert H Coons
Production of a Condition Resembling Typhoid Fever by Means of a Purified Antigen of the Typhoid Bacillus Mr Herbert R Morgan, A M
Results Obtained in a Laboratory Study of the Recent Epidemic of Influenza Dr John F Enders
The Production of Tetanus Toxin on a Peptone Free Medium Dr J Howard Mueller
Dinner will be served in the main dining room of Vanderbilt Hall, Harvard Medical School at 7 p m
The rules of the dormitory do not permit the attendance of ladies at the dinner
Reservations should be made not later than Monday, April 28

MASSACHUSETTS PUBLIC HEALTH ASSOCIATION

A business meeting of the Massachusetts Public Health Association will be held at the time of the New England Health Institute on Thursday, April 3, in Parlor A Hotel Statler Boston at 1 p m

SALEM TUMOR CLINIC

A teaching clinic on chronic cystic mastitis, to be followed by the presentation of cases of breast disease will be held at the Salem Hospital on Friday April 25, at 9 a m
The clinic will be conducted by Dr Shields Warren
Members of the Massachusetts Medical Society are cordially invited to attend

WACHUSETT MEDICAL IMPROVEMENT SOCIETY

The next meeting of the Wachusett Medical Improvement Society will be held at the Holden District Hospital on Wednesday, April 2, at 6 30 p m Dr Foster L Vibber, of Worcester, will speak on 'A Practical Application in Neurology and Psychiatry'

AMERICAN PUBLIC HEALTH ASSOCIATION

The seventeenth annual meeting of the American Public Health Association will be held in Atlantic City, New Jersey, from October 14 to 17
The American School Health Association, the Association of Women in Public Health, the National Organization for Public Health Nursing, the International Society of Medical Health Officers, the New Jersey Health and Sanitary Association, the American Social Hygiene Association, the Conference of State Sanitary Engineers, the Conference of Municipal Public Health Engineers, the Conference of State and Provincial Public Health Laboratory Directors, the Conference of State Directors of Local Health Administration and the Conference of Pneumonia Control Officers will meet in conjunction with the association

It will bring 4000 public health workers to Atlantic City for a series of scientific meetings covering all phases of health protection and promotion
For further information address the American Public Health Association 1790 Broadway at 58th Street New York City

AMERICAN ACADEMY OF PHYSICAL MEDICINE

The nineteenth annual meeting and scientific session of the American Academy of Physical Medicine will be held in New York City, April 28 29 and 30
The headquarters will be at the Hotel Pennsylvania where lectures symposiums clinical papers motion pictures and exhibits will be presented with clinics at the Medical Center New York Orthopaedic Hospital Post Graduate Hospital and the Skin and Cancer Hospital
There will be an evening session at the Academy of Medicine and a banquet at the Hotel Pennsylvania

The scientific program will be open to the medical profession without registration fee
For further information write to Dr Herman A Osgood Secretary, 144 Commonwealth Avenue Boston

SOCIETY MEETINGS AND CONFERENCES**CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, MARCH 30****MONDAY MARCH 31**

- 12 15-1 15 p m Cl n copal olog cal conference Peter Bent Brigham Hospital amph theater

TUESDAY APRIL 1

- 9-10 a m Cell Respiration Dr W Gleim Joseph H Pratt Dagnot c Hospital
12 15-1 15 p m Cl n copoentgenologic conference Peter Bent Brigham Hospital amph theater

WEDNESDAY APRIL 2

- New England Health Institute Hotel Statler Boston
9-10 a m Hosp tal case presentation on Dr S J Thannhauser Joseph H Pratt Dagnot c Hospital
12 m Cl n copal olog cal conference Children s Hospital

THURSDAY APRIL 3

- New England Health Institute Hotel Statler Boston
9-10 a m Vitamin B Deficiency (motion picture film) Joseph H Pratt Dagnot c Hospital
1 p m Massachusetts Public Health Association business meeting Parlor A Hotel Statler Boston

FRIDAY, APRIL 4

New England Health Institute. Hotel Statler, Boston.

- *9-10 a.m. Mental Changes in Paget's Disease. Dr. R. C. Wadsworth.
Joseph H. Pratt Diagnostic Hospital.

SATURDAY, APRIL 5

- *9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

*Open to the medical profession.

MARCH 31-APRIL 4—Sixth Annual Postgraduate Institute of the Philadelphia County Medical Society. Page 349, issue of February 20.

APRIL 1-29—Joseph H. Pratt Diagnostic Hospital. Medical conference program. Page 579.

APRIL 2—Wachusett Medical Improvement Society. Page 579.

APRIL 3—Hermann M. Biggs Memorial Lecture. Page 531, issue of March 20.

APRIL 6—Free public lecture, Quincy City Hospital. Page 436, issue of March 6.

APRIL 8—Harvard Medical Society. Page 578.

APRIL 10—New England Society of Psychiatry. Page 531, issue of March 20.

APRIL 10—Pentucket Association of Physicians. Page 263, issue of August 15.

APRIL 21-25—American College of Physicians. Page 1065, issue of June 20.

APRIL 25—Salem Tumor Clinic. Page 579.

APRIL 28-30—American Academy of Physical Medicine. Scientific session. Page 579.

APRIL 30—Boston Society of Biologists. Page 579.

MAY 5-9—American Association of Industrial Physicians and Surgeons and American Industrial Hygiene Association. Page 484, issue of March 13.

MAY 13-16—National Gastroenterological Association. Hotel Commodore, New York City.

MAY 21, 22—Massachusetts Medical Society, Boston.

MAY 28-JUNE 2—American Board of Obstetrics and Gynecology. Page 262, issue of February 6.

MAY 30-JUNE 2—American College of Chest Physicians. Hotel Statler, Cleveland, Ohio.

JUNE 2-6—American Medical Association. Cleveland, Ohio.

OCTOBER 14-17—American Public Health Association. Page 579.

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

APRIL 2—Pediatric Problems in General Practice. Dr. Joseph Garland. Addison Gilbert Hospital, Gloucester.

MAY 14—Relation of the Doctor to the Law. Mr. Leland Powers. New Ocean House, Swampscott.

FRANKLIN

MAY 13—This meeting will be held at 11 a.m. at the Franklin County Hospital, Greenfield.

NORFOLK

MAY 8—Censors' meeting. Hotel Puritan.

SUFFOLK

APRIL 30—Page 604, issue of October 10.

MAY 1—Censors' meeting. Page 261, issue of February 6.

WORCESTER

APRIL 9—Hahnemann Hospital, Worcester.

Supper at 6:30 p.m. followed by a business meeting and scientific program.

BOOK REVIEWS

The Early Diagnosis of the Acute Abdomen. By Zachary Cope, A.B., M.D., M.S. (Lond.), F.R.C.S. (Eng.). Eighth edition. 8°, cloth, 257 pp., with 36 illustrations. London: Oxford University Press, 1940. \$3.75.

This handy volume is essentially a diagnostic primer. Its value lies in its simplicity and proper emphasis of well-established facts rather than in any new analysis of symptoms or signs. The author stresses continually the need for accurate diagnosis in patients with acute abdominal symptoms. To accomplish this it is necessary to take a very careful history and to make a thorough physical examination. The urinary and blood findings are valu-

able supplementary data, although the author says little about the white-blood-cell count and nothing about the value of a differential count of the white blood cells.

In no other group of cases is judgment at a greater premium than in the diagnosis of acute surgical conditions of the abdomen. Such patients often enter in the early morning hours; they present the problem of pain that must be relieved; and on the basis of a few available facts one must decide whether operation is necessary and, if so, where the incision should be made. Cope has ably summarized the classic pictures, and has also indicated some of the leads that show the way when the picture is very confusing. The intangibles that cannot properly be put in writing and that must be interpreted can be mastered only through study of and experience with patients. Is spasm voluntary or involuntary? Are signs at the base of the right lung primary, or secondary to abdominal disease? Are the urinary findings due to a pelvic appendix? The answers to questions such as these rest entirely on judgment and experience.

To the medical students in this country and abroad this volume will be a great friend in guiding them through the intricacies and pitfalls of diagnosis in acute abdominal conditions. This new edition offers only slight change from the previous ones.

Manual of Cardiology: Clinical methods and case histories as problems for study. By William Duncan Reid, A.B. M.D. 8°, cloth, 364 pp. London: Oxford University Press, 1940. \$3.50.

The first one hundred and thirty-five pages of this book describe the clinical methods of the author. The rest of the book is concerned with a description of a series of fifty-six case histories followed in a separate section by discussions of the cases. The author admits that "the language of Section I is purposely very informal," but although this may serve his purpose of making "the text easier to read and more forceful," it creates an impression of carelessness. This is added to by the various errors in spelling and syntax, and the irritatingly poor proofreading. It seems unnecessary to mention the very unimportant signs of Duroziez and Graham Steell in a book of this sort, doubly so when the names are misspelled on each occasion.

Much of the discussion of clinical methods will be useful for the undergraduate student, and since the book is not intended as a textbook, it should not be too harshly judged by its omissions. Some rather obvious ones, however, may be noted, such as the failure to mention pulmonary infarct as the commonest cause of jaundice in cardiac patients, the inadequate description of the mechanism of gallop rhythm that is such an important physical sign, and the omissions of venesection in the treatment of acute pulmonary edema and of oxygen in acute coronary occlusion or cardiac failure.

The method of presentation by case histories of the material in Sections II and III has become established as a valuable technic. The case reports are, at times, instructive, but often one is asked to consider the diagnosis on the basis of inaccurate observations purposely given to indicate the errors of examination. It is questionable if this teaches anything except to mistrust all examinations save one's own. It is used by the author, for example, to illustrate errors in the diagnosis of the presystolic murmur that his colleagues seem so often to have found without anatomic basis. The discussion of this murmur is rather naïve in the light of present knowledge of the mechanism of heart sounds and murmurs.

the diagnosis of some of the cases may be questioned. For example, Case 28 is considered pulmonary stenosis and entricular septal defect. In the absence of cyanosis of the fingers, this seems unlikely. A septal defect is more probable.

The book will teach the beginner many practical points, and the case reports are a stimulus to diagnosis. The chief value of the book is in emphasizing methods of approach to clinical problems, and it should be helpful mainly for graduate instruction.

Management of the Cardiac Patient By William G. Lea, Jr. M.D. 8°, cloth, 705 pp., with 255 original illustrations, two in color, 29 tables. Philadelphia: J. B. Lippincott Company, 1940. \$6.50.

Progress in modern medicine is advancing at so rapid a pace that it is impossible for the general practitioner or internist to keep abreast of the entire current literature in one field. The author of a good textbook is eager of this rich harvest, he must also select the cream of the chaff. Dr. Leaman has succeeded in assembling in one volume most of the essential facts in the management of the cardiac patient. In the twenty-four chapters of this book are included most of the types of disease that are commonly met in the clinic and hospital.

Since modern cardiology is dynamic rather than static—that is, emphasis is laid on the etiology of the disease and the functional capacity of the patient, rather than on the description of the structural defect—the author proceeds from that point of view. Each chapter is a theoretical exposition, just long enough to cover essential facts, and short enough to hold the reader's interest. Variations that occur in the different types of disease are also considered. The book is up to date in that it includes most of the recent advances made in cardiology. There is a brief discussion of total ablation of the thyroid gland in selected cases of patients suffering from congestive cardiac failure or angina pectoris, published in 1933, as well as the latest Boston contribution—Crosby operation for the ligation of the arteriovenous anastomosis in patent ductus arteriosus. Each chapter ends with a number of illustrative cases. The book contains numerous original illustrations, two of which are in color. These help to clarify a complicated subject. It is gratifying, indeed, that during these days of scientific medical research, but also in making this volume available to many by textbooks as fine as one.

Diseases of Infancy and Childhood A textbook for use of students and practitioners. By the late L. Emmet Holt, M.D., and John Howland, M.D. Revised by Emmet Holt, Jr., M.D., and Rustin McIntosh, M.D. Tenth edition. 4°, cloth, 1421 pp., with 262 illustrations and 8 plates. New York: D. Appleton Century Company, Incorporated, 1940. \$10.00.

For many years Dr. Holt's book stood as the bible of pediatricians in the United States. Its status paralleled that of the *Principles of Medicine*, every doctor knew it and every doctor owned it. With the passing of Dr. Holt and of Dr. Howland, who had collaborated with him in the distinctive personal touch naturally departed, but his last analysis the loss was largely sentimental. In three successive editions for which the new authors are responsible, they have improved increasingly their clinical abilities. Although the title page speaks of revision, more than revision has been done. They have

emerged with a new book, and Holt much better, in certain respects, than the old one ever was.

It covers a great deal more ground. Originally, as the title implied, the book was almost wholly concerned with the child in sickness. Now, and to a greater extent in this edition than in its immediate predecessors, much space has been given to hygiene, nutrition, growth and feeding. But there is still further departure in this latest issue. Because the general subject has so grown and because within the specialty new specialties have arisen, thirty-four subsidiary authors have been requisitioned for contributions. Such a move, we grant, is not always happy in its results, too often the disadvantages outweigh the benefits. A multiplicity of authors commonly means a multiplicity of points of view, an uneven scale of values and emphases. But teamwork has prevailed, and the unity of the book has not been appreciably disturbed. One might almost have anticipated which sections would require the greatest changes—those relating to diseases of the newborn, nutrition, allergy, endocrinology, the deficiency diseases, the diseases of the blood and some of the specific infections. These have been expanded, and although in previous editions the material at times has been compressed to keep the general bulk within bounds, this eleventh edition runs two hundred pages longer than the tenth. It should be added that there is an entirely new section on diseases of the eye, some of the pictures are different, and there are some new charts.

The more one studies this book, section by section, the more one is likely to be impressed. Apparently there are no significant omissions, and there is a gratifying sense of proportion and balance. If the facts are up to the minute, so too is the point of view. There are excellent bibliographies. The publisher has also done his part, in format, in printing and in clarity of illustration. This book leaves little to be desired.

It may not be the old familiar Holt, it may not be indispensable. But it is nevertheless an outstanding book, one that can be trusted and valued and repeatedly used.

The Individual and his Society: The psychodynamics of primitive social organization By Abram Kardiner, M.D. With a foreword and two ethnological reports by Ralph Linton. 8°, cloth, 503 pp. New York: Columbia University Press, 1939. \$3.50.

Although this book will be of little interest to the general practitioner, it doubtless has value for the psychiatrist and psychoanalyst interested in reading on the periphery of their subjects. It also has a certain value for sociologists who are not impatient with such ultra abstract attempts to co-ordinate anthropology, sociology, psychology and psychoanalysis.

Dr. Kardiner is a practicing psychiatrist. The material in this book is the product of a seminar held at the New York Psychoanalytic Institute over a period of three years. Although the main body of the material is an ethnological, eight primitive cultures having been studied in the seminar, the author seems to be concerned mainly with personality, and with a somewhat new and original methodology. There is here a kind of dialectic between basic personality structure and institutions.

The interrelations between personality and culture have been a subject of renewed interest among sociologists in recent years. This mature discussion of the subject should stimulate thought among those working on the firing line of this special field.

Dynamics of Inflammation: An inquiry into the mechanism of infectious processes. By Valy Menkin, M.D. 8°, cloth, 244 pp., with 50 illustrations and 27 tables. New York: Macmillan Company, 1940. \$4.50.

This is a careful and well-documented report of the author's views and experimental work in the field of inflammation, particularly emphasizing the humoral aspects. His extensive researches in the field of leukotaxine and other substances are clearly presented.

After a brief historical survey, sections are devoted to the mechanism of capillary filtration, the capillaries in inflammation, the mechanism of increased capillary permeability, the migration of leukocytes into inflamed tissue, cellular sequence in inflammation, the phagocytic theory, the mechanism of leukocytosis with inflammation, inflammation in relation to immunity, the concept of fixation, the localization of foreign material in areas of inflammation, allergic and anaphylactic inflammation, the role of lymphatics in inflammation and inflammation and bacterial invasiveness in relation to resistance. There is an excellent bibliography.

The author's viewpoint can be summarized briefly as follows: the principal sequences in the development of inflammation are increased passage of fluid through the walls of the capillaries, localization of irritant and migration of the leukocytes.

Cancer: A manual for practitioners. The Committee on Publication: George W. Holmes, M.D., chairman, Shields Warren, M.D., and Ernest M. Daland, M.D. Editor: Channing C. Simmons, M.D. 8°, cloth, 284 pp. Boston: Rumford Press, 1940. \$2.00.

This volume aims to assist the practitioner in the diagnosis of cancer at an early stage, while it is still amenable to treatment—a most commendable purpose. Compiled as part of the program for the control of cancer in Massachusetts, it has been sent to all the practitioners in this state.

The work is comprised of individual essays by men with wide clinical experience and a lively interest in the problems discussed. Most of the authors are Massachusetts men, and it is through their excellent work that the death rate from cancer in this state has finally shown some improvement.

If each practitioner sees only an occasional case of cancer during the year, he needs some work such as this to keep his suspicions of the disease alive. From this standpoint all the facts presented are useful. The only possible criticism is the arrangement of the chapters. It might have helped to develop and sustain the interest of busy practitioners if the first chapters had been practical rather than devoted to the historical and investigative aspects of cancer.

The Foot and Ankle: Their injuries, diseases, deformities and disabilities. By Philip Lewin, M.D. 8°, cloth, 620 pp., with 303 illustrations. Philadelphia: Lea and Febiger, 1940. \$9.00.

This is a very complete and exhaustive review of all conditions concerning the foot and ankle. The illustrations, which are numerous and some of which are from other authors, make the text easy to understand.

The first part of the book takes up in detail the office or ambulatory treatment of various conditions, such as with shoes, supports and plaster casts. Then follow in detail the various operative procedures that are used in this country, with due credit to the originators. Dr. Lewin has kept a very good balance between operative

orthopedics and other conditions, so that this book is of value to practitioners as well as to orthopedic surgeons.

Report on the Sex Question by The Swedish Population Commission. Medical Aspects of Human Fertility Series. Issued by the National Committee on Maternal Health, Incorporated. Stockholm, 1936. Statens Offentliga Utredningar 1936:59. Translated and edited by Virginia Clay Hamilton, M.D. 8°, cloth, 182 pp., with 9 tables. Baltimore: Williams and Wilkins Company, 1940. \$2.00.

Although this book touches on several angles of the sex question, it is mainly an argument for a liberalization of the laws in Sweden concerning the dissemination of birth-control information. It is a scientific treatise devoid of emotional bias. Considerable emphasis is placed on the decline of natality in Sweden, and there is an extensive discussion of probable causes. There is a warning against the intensive use of contraception to a point where it would endanger folk stock. This tendency to such intensive use is recognized by the commission, but the members believe that this would be more than offset if sociologic and economic conditions preventing early marriage were so adjusted as to eliminate this handicap. There is a very sane and dispassionate evaluation of the use of contraception in extramarital relations. There is an excellent chapter entitled "Sex Enlightenment: Its organization in a broadened and improved education for parenthood."

The Doctor and His Patients: The American domestic scene as viewed by the family doctor. By Arthur E. Hertzler, M.D. 8°, cloth, 316 pp. New York: Harper and Brothers, 1940. \$2.75.

Dr. Hertzler's success with his previous volume, *The Horse and Buggy Doctor*, has led him to write a second book, not nearly so satisfactory as the first. To be sure, his object is somewhat different, for he is not telling the story of his life in this volume, but is attempting to analyze the lives of his patients. The comments are, in general, excellent, but there is also considerable uncertain thinking on problems that, although interesting, are not elucidated by the doctor's writing. There is perhaps not much to criticize in this book, but on the other hand, there is little to praise.

A Manual of the Common Contagious Diseases. By Philip Moen Stimson, M.D. Third edition, thoroughly revised. 12°, cloth, 465 pp., with 54 engravings and 6 plates, 4 in color. Philadelphia: Lea and Febiger, 1940. \$4.00.

This reliable, up-to-date, pocket-sized manual is stripped of all nonessentials. The first two chapters deal with the general subject of infection, immunity and serum reactions. The last is concerned with the general management of contagious disease in hospital and home. The rest is devoted to the several specific diseases most commonly encountered in children—diphtheria, Vincent's angina, scarlet fever, measles, rubella, pertussis, mumps, varicella, smallpox, meningococcal meningitis and poliomyelitis. The manual discusses the etiology, pathology, diagnosis, complications, treatment and prevention of each disease. The printing and illustrations are excellent. There is a good index, and a helpful glossary. The book can be highly recommended to the student of medicine or of public health and the practitioner who wants to brush up on the latest accepted opinions in this field.

The New England Journal of Medicine

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VOLUME 224

APRIL 3, 1941

NUMBER 14

SYMPOSIUM ON DIABETES

THE TREATMENT OF DIABETES WITH DIET AND INSULIN*

ALEXANDER MARBLE, M.D.†

BOSTON

DIET

THE basis of the successful treatment of diabetes is a carefully planned diet adequate in all respects. It is not enough to make provision for the proper amount of carbohydrate, protein, fat and calories; further care is necessary to be sure that an ample supply of vitamins and minerals is included. The best approach to the prescription of any special diet is that of viewing it as a modification of the ideal normal diet so arranged as to promote optimal health. Because the diabetic patient must follow his special diet for years, ample opportunity is afforded for dietary deficiencies to develop, if this possibility is not kept in mind. These can, and must, be avoided by careful planning at the very start of treatment.

Those unaccustomed to the prescription of special diets are often inclined to regard the procedure as complicated. This need not be so. The diabetic diet can be simplified and made easy enough for any patient to understand and follow. The modern diabetic diet allows the average patient fresh fruit, cereal, an egg, one half to one slice of toast, butter and cream for breakfast, and at lunch and supper an average serving of meat, fish, eggs or cheese, liberal amounts of the green, leafy, so-called "5 per cent" vegetables, an average serving of any one of the so-called "10 per cent" vegetables, one half to one slice of bread, perhaps a small potato, butter, and an average serving of fresh fruit. Add to this, tea or coffee, with cream if desired, and at least one half pint of milk for adults and one pint for children, together with a light lunch at bedtime, and one has a simple, easily obtainable, palatable, satisfying diet, furnishing 140 to 160 gm of carbohydrate, 60 to 80 gm of protein,

70 to 100 gm. of fat and 1400 to 1900 calories a day. Naturally modifications of this average diet must be made, depending on the age, sex, weight, activity and complicating conditions of the patient, but if a very few basic food values are learned, substitutions, additions and subtractions may be accomplished easily by doctor or patient.

Although the prescription of the diabetic diet can and should be made simple, this should not be done by the use of blanket forms, since such a practice leads to haphazard and slipshod treatment. Dietary therapy must be individualized. An obese patient requires a diet low in fat and in calories, and a lean one the opposite. Growing children require relatively greater allowances of protein, lime salts and calories than adults do, and the diet must be adjusted so as to provide these. It is possible at times to control the hyperglycemia and glycosuria of a diabetic child and still treat him miserably; and because of adherence to the adult type of diets, which may be relatively lower in protein and calories, growth may not take place and dwarfism may result.

Dietary directions must be stated simply and at the same time specifically. Merely to hand the patient a sheet on which are listed "foods forbidden" and "foods allowed" will usually fail to get the best results, unless the diabetic condition is quite mild and amenable to only slight restriction of diet. A preliminary period of a few weeks in which the patient weighs his food accurately on gram scales provides invaluable training. The inconvenience may be reduced to a minimum by the use of scales with a movable dial, which makes unnecessary the separate weighing of containers. The weighing of food should be regarded chiefly as a means to an end, rather than an end in itself; the object is to train the eye and hand of the patient so that after a few weeks he may pick

*This and the following two papers were presented as a symposium at the annual meeting of the New Hampshire Medical Society, Manchester, May 14, 1940.

†Instructor in medicine, Harvard Medical School, physician, New England Deaconess Hospital.

out with reasonable accuracy the proper portions of food wherever he may be. Occasional return to weighing is desirable to refresh the memory or to become familiar with the amounts of new foods allowable.

It is often said that diabetic diets are expensive because of the necessity for special foods. The truth is that they are only slightly more expensive than average nondiabetic diets, and probably no more costly than nondiabetic diets that are truly well balanced and adequate in all respects. Articles high in carbohydrate, such as bread, potatoes, beans, corn and macaroni, are the cheapest, to be sure, but when they form the basis of a diet, they are apt to make it deficient in certain respects, chiefly in vitamins and minerals. Special foods such as gluten bread, diabetic flour and bran muffins are no longer necessary and represent a needless expense. As a matter of fact, because of its relatively high protein content, gluten bread actually offers little or no advantage over ordinary bread. Almost the only special foods worth considering are the water-packed fruits and vegetables, which permit a varied selection of food at those times of the year when fresh fruit and vegetables may not be available.

All diets should contain enough milk, cream, eggs and cheese to provide an adequate intake of the lime salts—calcium and phosphorus. The daily requirement of calcium is commonly stated to be 0.7 gm. for adults and 1.0 gm. for children. If the calcium requirement is met in the form of foods, the phosphorus intake will almost invariably be adequate also, because of the common association of the two elements. The usual diabetic diet without milk and eggs or their products will often be found to furnish approximately 0.4 gm. calcium a day; approximately 0.1 gm. calcium is contained in 3 eggs and in each of the following: 3 ounces (83 gm.) of milk, $3\frac{1}{2}$ ounces (104 gm.) of 20 per cent cream, 4 ounces (116 gm.) of cottage cheese and $\frac{1}{3}$ ounce (11 gm.) of American cheese.

Whole-grain bread and cereals are far superior to white bread and refined cereals in vitamin and mineral content and should be used in whole or in great part. Patients must be taught to eat green, leafy vegetables and fresh fruit, since these foods contain much in the way of essential minerals and vitamins.

INSULIN

Although everyone can appreciate the natural reluctance of patients to submit to daily hypodermic injections, physicians render better service if they reverse the usual viewpoint and, instead

of advising insulin as a last resort, follow the rule of prescribing insulin in every case, unless a good reason exists for not doing so. A good, general guide is as follows: if, on a diet that is necessary to maintain health, weight and strength, a patient cannot keep sugar free, insulin should unhesitatingly be prescribed in dosage suited to him. Patients must be urged to receive the benefit from as much insulin as they can without developing hypoglycemia or symptoms of overdosage. Almost without exception, every child with diabetes should receive insulin daily from the day of diagnosis.

It helps to assure patients repeatedly that by taking insulin no habit is formed. One must emphasize that the diabetic patient is all the better and none the worse for having taken insulin, and that if, wisely or unwisely, it is later given up, the worst that can happen is that the patient will revert to the condition existing before he began insulin. Actually, many patients with the milder grades of diabetes are able to give up insulin entirely after the condition has been brought under control with energetic treatment.

Whatever is done, patients should not be asked or allowed to take oral preparations in place of insulin. So far, no effective, practicable oral preparation of insulin has been developed. Despite this, patients are all too often allowed or even advised to take these worthless yet expensive products, if one can accept as reliable the statements made by manufacturing concerns of the amount of their products used annually.

The insulin of choice at the present time is the protamine zinc variety. With many patients, one dose of this type of insulin in the morning before breakfast suffices to bring about satisfactory control of the diabetic condition throughout the twenty-four-hour period. However, with children and young adults and in older patients with more severe diabetes, it is necessary to combine with the turbid, slowly acting protamine zinc insulin a dose of rapidly acting, clear insulin taken at the same time in the morning before breakfast. This clear insulin may be of either the so-called "regular" or the crystalline type. Since June, 1939, we have used successfully the crystalline type of insulin almost exclusively in situations in which a rapidly acting variety was indicated. The division of the total dose of insulin between the clear and turbid types has not only the advantage of better control of diabetes but also of preventing night reactions from an overdose of protamine zinc insulin.

When both types of insulin are taken in the morning before breakfast, we prefer to give them by separate injections, administering the clear in-

ulin first. Some clinicians have permitted the mixing of two types in one syringe, thus making necessary only one puncture of the skin. This has two disadvantages. In the first place, manufacturers place in protamine zinc insulin an excess of protamine; when regular or crystalline insulin is mixed with protamine zinc insulin, a part of the clear type is bound by the protamine so that, depending on the duration of contact between the two types, to a greater or less and probably to a variable degree, one has a slightly larger dose of protamine zinc and a slightly smaller dose of clear insulin than one planned at the outset. Of even more importance is the fact that it is technically difficult to withdraw into one syringe accurately a dose of two types of insulin from two different vials. On the basis of careful studies of the blood-sugar response, Wauchop¹ has likewise concluded that better results are obtained if the two types of insulin are given by separate injections.

When the two kinds of insulin are taken daily in the morning before breakfast, the adjustment of the insulin dosage becomes very simple. Two tests of urine for sugar are important: the test of urine voided before breakfast (preferably not an overnight specimen but a second specimen passed a few minutes later but still before insulin and breakfast), which indicates the effect of the protamine zinc insulin taken the day before; the test of urine voided just before the noon meal, which indicates the effect of the crystalline insulin taken on the same day. With the average patient, these two tests, if carried out by Benedict's method, should give reactions varying between a blue and a light green. Increases or decreases of two units at a time may be made in either or both types of insulin as the urine tests dictate. It is usually best to allow two or three days between changes.

There are certain misconceptions prevalent regarding the use of insulin. Among these may be mentioned the fear of using insulin in the presence of coronary heart disease. In such patients, insulin should be used without hesitation to control the diabetic condition, although with sufficient caution and care to avoid hypoglycemic reactions. A second error is the very prevalent assumption that during times of acute illness, insulin should be omitted when the patient is not eating. This single point has caused untold difficulty for diabetic patients. Repeatedly, patients have been admitted to the hospital in diabetic coma that has resulted from the omission of insulin during an acute infection accompanied by gastrointestinal symptoms, which prevented eating the usual amount of food. Patients forget that, particularly if the diabetic condition is severe, a certain amount of

insulin is necessary daily, even though no food is eaten; this becomes all the more important if an infection with fever is present. The patient must be instructed over and over again never to omit insulin during an acute illness, unless the urine is found at three or four hourly intervals to be free from sugar. A third erroneous belief is that in certain patients "insulin does not work." In reporting deaths of diabetic patients, statements are sometimes made that insulin was entirely ineffective in lowering the blood sugar, despite the giving of large amounts, at times several hundred units, within a few hours. The fact is that in certain conditions, particularly acidosis, coma and those rare cases of so-called "insulin resistance," the relative effectiveness of a unit of insulin drops markedly, so that one must discard the usual rules of action and give larger and larger amounts until the desired effect on the blood sugar is obtained. This may mean, as in certain of our patients, approximately 2000 units a day for as long as ten days, but it has been our experience that insulin can never be said to be ineffective, provided large amounts are given early enough.

It has recently been stated that if a diabetic patient is given protamine zinc insulin daily and is kept free from symptoms characteristic of the disease, and if the urine is kept free from acetone bodies, glycosuria and hyperglycemia may be disregarded, even though they may be marked.² We enthusiastically approve of the use of protamine zinc insulin, but we believe firmly that it should be used in such dosage, with or without an appropriate dose of crystalline insulin and a restricted diet, that glycosuria is completely or nearly abolished, and the blood sugar kept at a level not far above normal. We believe in the early, vigorous treatment of diabetes and the careful, continuous control of the condition in an attempt to restore normal conditions in the body so far as possible; this conviction has been strengthened by the results of studies in animals reported recently by Haist, Campbell and Best³ and by Lukens and Dohan.⁴ We believe that anyone who follows his patients over years of time until death, and who compares the results in those treated poorly and those treated well, will come to the conclusion that the careful treatment of diabetes pays. Patients may appear to be well for months and years despite constant glycosuria and hyperglycemia, but our experience leads us to believe that these abnormal conditions in the end prove harmful to the patient. Try as we may, it is usually impossible to achieve ideal control of the diabetic condition, but that should be the aim of treatment in every case.

Less than 100 per cent control is a situation to be tolerated rather than to be sought. With such care, one may reasonably hope that most diabetic patients may happily and usefully live out a life expectancy approaching closely that of the normal person, meanwhile avoiding complications characteristic of the disease.

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REFERENCES

1. Wauchope, G. M. Zinc protamine insulin and soluble insulin: interaction in combined doses. *Lancet* 1:962-966, 1940.
2. Tolstoi, E. and Weber, F. C., Jr. Protamine zinc insulin: a clinical study; report of a group of diabetic patients in whose cases glycosuria was disregarded for one year. *Arch. Int. Med.* 66:670-678, 1940.
3. Haist, R. E., Campbell, J. and Best, C. H. The prevention of diabetes. *New Eng. J. Med.* 223:607-615, 1940.
4. Lukens, F. D. W. and Dohan, F. C. Morphological and functional recovery of the pancreatic islands in diabetic cats treated with insulin. *Science* 92:222, 1940.

DIABETES IN YOUTH*

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DURING the last few years, clinical, genetic and physiologic research has done much to clarify and change our concept of diabetes, and this discussion is an attempt to correlate this newer knowledge with the cause, prevention and treatment of diabetes and its complications in childhood, and the cause, prevention and treatment of the common accidents occurring when diabetes complicates pregnancy.

The management of diabetes in the young patient arouses general interest, in spite of the fact that the incidence is certainly not more than 1 in 2500 children under fifteen years of age; however, the complications are sufficiently manifold to bring these patients into all branches of medical and surgical practice.

A brief discussion of the fundamental cause and its mechanism of action is of value, because these are the bases on which serious attempts at alleviation of both experimental and clinical diabetes are being made.

That the tendency to develop diabetes is inherited cannot be doubted. It is the one link connecting all age groups. In childhood, when the expanse of life permits it, family histories of the disease increase with duration. Only 20 per cent of children in our clinic have a known diabetic relative when first seen, but after they have been followed for fifteen years 50 per cent have a known heredity.

The actual evidence in favor of the theory of inheritance of the diabetic tendency lies in the demonstration of diabetes in similar twins, the statistically significant excess of diabetic incidence in the close blood relatives of diabetic as compared with those of nondiabetic patients, and the demonstration of Mendelian ratios of the recessive type in a large series of cases selected at random and in presumably latent diabetic patients.

Diabetes, even in the child, is not evident at birth or soon thereafter but appears to follow a rhythmic age behavior stimulated at pubescence and at senescence. Of recent years its occurrence has been attributed to complex endocrinal factors — especially an interrelation of the pituitary gland and the pancreas.

At the onset of the disease the child presents presumptive evidence of hyperactivity of the pituitary gland: his height, metabolism and bone and dental development are in advance of the normal for his chronological age, and his puberty is precipitated.

The final production of diabetes by injection of anterior pituitary extract has led to attempts at alleviation by pituitary inhibition. Radiation and extirpation are obviously too dangerous. Estrogens and androgens theoretically capable of depressing pituitary activity have been tried, the former with some success.¹

Low-carbohydrate diets and hyperinsulinization of the patient at onset have also been attempted, the former in our clinic prior to the discovery of insulin and up to the last decade. Hyperinsulinization was seriously attempted in childhood diabetes in 1930, by Brush² in New York City, and for the same purpose perfect control of diabetes is being attempted by Jackson, Boyd and Smith³ today. Cures have not been reported from any of the attempts. The latent rather than the out-and-out diabetic person must be sought for these experiments, but control of the spread of the disease may be sought by out-breeding, that is, by advising against the intermarriage of families with diabetes.

The treatment of diabetes in children consists in regulation of diet, administration of insulin, adjustment of exercise, education of the entire family and protection of the child against himself.

The caloric requirement, though dependent on surface area, follows age closely in childhood. For simplicity we prescribe calories by age: 1000 at

*Presented at the annual meeting of the New Hampshire Medical Society, Manchester, May 14, 1940.

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age one and 100 per year of age until the completion of growth and development. Carbohydrate, protein and fat are prescribed in gram ratios of 2.1 1 respectively.

Insulin is administered to all diabetic children, preferably continuously from the day of recognition of the disease. Few children, only 10 per cent, do well with protamine zinc insulin alone, and 90 per cent require both the rapidly and slowly acting types. The initial prescription for a newly contracted case, which for the time being will do well with protamine zinc insulin alone, is based on age—under five, 10 units, between five and ten, 20 units, and between ten and fifteen, 30 units. The readjustment of the long standing case is facilitated by continuing with the usual dose of rapidly acting insulin before breakfast, and supplementing with twice that quantity of protamine zinc insulin. Readjustments are then made in accordance with premeal and retiring specimens of urine.

The chemical standards for control are glycosuria of less than 10 per cent of the carbohydrate intake, a normal blood-sugar level before meals and a blood-cholesterol level below 230 mg per 100 cc.

Postmeal exercise and premeal rest periods are advocated. To the parents one must emphasize the fact that diabetes is not a bed or chair disease but an exercise disease. Education of the entire family, equal to that which is rapidly acquired by the child, cannot be overemphasized. The acceptance of a child's statement relative to diabetic facts as a substitute for more accurate knowledge that has been acquired by the family through self-education leads to tragedy for the child and unsatisfactory care of the diabetes. To provide constructive protection against the child's feeling of security in spite of indiscretions, it has been necessary to start educational units in camps and schools.

Controllable and seemingly uncontrollable complications occur during the course of diabetes in the young patient. Coma, infections, hepatomegaly, some of the skin complications and failures of growth and development are now correctable. The degenerative and deficiency diseases remain unsolved, but, I believe, are not unsolvable. These complications I shall merely catalog, and thus summarize their essential differences in behavior and their management when they occur in childhood rather than in adult life.

Excess of incidence, simplicity of treatment and sureness of favorable prognosis characterize coma in the young population. The severity of the disease in the child, as well as the occurrence of irregularities of diet, the omission of insulin and infections, account for the relatively high inci-

dence. The treatment consists largely of three measures—insulin, fluids and gastric lavage. The prognosis for recovery, unless the patient has a lethal infection or is actually moribund before treatment is inaugurated, is 100 per cent.

The decreased incidence of tuberculosis in the entire population is reflected in the juvenile diabetic population. Chemotherapy protects the adolescents from deaths from septicemia, which formerly so often followed infections of the skin and urinary tract.

Hepatomegaly, of interest physiologically and of importance clinically because of the bouts of abdominal pain, is corrected and prevented by protamine zinc insulin. One biopsied case in our series showed 10 per cent fat and 12 per cent glycogen in the liver.

Metabolic skin lesions are seen frequently in the child. Xanthosis, due to the excessive intake and failure of metabolism of carotene, is corrected when the foods high in carotene are eliminated. The lesions of xanthoma diabeticorum, which we have not seen in a patient treated with protamine zinc insulin, disappear when the blood fat falls to normal levels. The early lesions of necrobiosis lipoidica diabeticorum—perhaps cutaneous gangrene—have been controlled by x ray therapy, but no satisfactory treatment of the late lesions has been found.

Neuritis seldom occurs in childhood, but is not uncommon in patients in their twenties. It has not been controlled with vitamin B therapy. Diabetic nocturnal diarrhea, commoner in the young patient and frequently an accompaniment of neuritis, appears to have been controlled by liver extract.

The incidence of degenerative complications in juvenile diabetes far exceeds expectation. Cataracts occur early in its course, are not always progressive, and can be treated surgically. Retinal hemorrhages may be reversible. Retinitis may also be reversible but, unfortunately, the incidence of its severest form—retinitis proliferans—is high in long standing severe diabetes.

Based on an analysis of diabetic children who have had the disease for fifteen years, arteriosclerosis appears inevitable. The lesion can be attacked from different angles. If it results from uncontrolled diabetes, hyperglycemia, acidosis or dehydration, the more perfect control of the diabetes by combined insulin therapy should prevent it in the future. If it is due to improper metabolism of fat, lipotropic substances, such as choline and lipocain, may prevent its occurrence. Even though it may prove to be a degenerative stigma inherited with diabetes, arteriosclerosis should yield to some therapeutic agent, just as

diabetes is controlled by insulin. If, as seems possible, it is a part of the complex endocrine imbalance, more perfect and combined endocrine therapy may solve the difficulty as it appears to have done in the next two problems, namely, failures of growth and development, and accidents of pregnancy in diabetes.

The situation of pseudodwarfism in diabetes appears paradoxical. The failure of growth is not observed until several years after onset. Obesity occurs in proportion to the duration of retarded growth, and the child has the characteristics of pituitary failure—delayed development of bone and of teeth, with normal intelligence. Three possible explanations are that it is a congenital anomaly, the result of undernutrition or the result of fatigue of the pituitary gland. Along with failure of growth, mildness of diabetes usually occurs. These patients respond to intramuscular anterior pituitary extract and oral thyroid therapy. The increased severity of the diabetes is sacrificed for the social and economic importance of the problem.

A mechanism similar to that responsible for the production of diabetic pseudodwarfism appears to explain the high incidence of accidents when pregnancy complicates diabetes. These data are more convincing because, although we have not measured the hormones in the dwarfish patients, we have measured the hormones of our pregnant diabetic women.

Our present conception of the mechanism of the accidents in diabetic pregnancies has been the outcome, first, of the realization that insulin therapy did not lower fetal mortality (preinsulin 42 and insulin 38 per cent) and, secondly, of the behavior of diabetic pregnancies in relation to the pregnancy hormones, which Smith and Smith⁴ first studied in a number of our patients, to extend their work on pre-eclamptic toxemia.

Our present conception is that an abnormal rise of serum chorionic gonadotropin after the twentieth week predicts accidents, that the accidents are caused by failure of production or metabolism of estrin and progesterin, and that they are prevented by continuous substitutional estrin and progesterin therapy in replacement doses.

This statement is based on a series of 84 cases of completed pregnancies studied between 1936 and 1941. The early analyses were made by Smith and Smith as part of their research, the later ones in the laboratory of the New England Deaconess Hospital, where we have attempted to establish them on a routine rather than a research basis.

Classified by prolan values, the rise occurring two to six weeks before clinical signs, there were

36 patients with normal behavior. There was no toxemia, no premature deliveries, and three neonatal deaths,—due to asphyxia pallida, hemorrhagic disease of the newborn and multiple congenital anomalies,—making fetal survival 92 per cent.

Twelve patients with significant rises had no treatment. All the mothers had an abnormal course, 9 of the 12 had pre-eclamptic toxemia, 3 had premature deliveries, and fetal survival was 42 per cent. The clinical picture was clarified. Maternal and fetal behavior fell into two classes. Either the mother developed a lightninglike toxemia, usually with hydramnios, and delivered a macerated stillborn child, or without toxemia she delivered prematurely a large atelectatic infant dying within a few hours of birth.

The next step was an attempt at prevention. At the suggestion of Smith and Smith, estrin and progesterin* in doses as near replacement as possible were given continuously after the rise of the prolan. Signs of toxemia were controlled. Premature deliveries did not occur, and fetal survival was 13 out of 14 cases, or 93 per cent, contrasted with 42 per cent in the untreated group.

Although this therapy appeared to be successful, because of the cost it was a physiologic curiosity. For this reason, at the New England Deaconess Hospital we substituted synthetic and inexpensive preparations, Stilboestrol† and Pranone. Eleven cases were treated with oral substitutes. There were two fetal deaths, including one due to erythroblastosis. Another 11 abnormal cases were treated with intramuscular Stilboestrol and Proluton. Ten of these infants survived. The fetal survivals in the three groups are as follows: normal prolan, 93 per cent; high prolan, untreated, 42 per cent; and high prolan, treated, 89 per cent.

The characteristics that occur in the infant are gigantism and hyperplasia of the islands of Langerhans, which we correlate with the imbalance of pregnancy hormones. In the experimental animals prolan has also produced both these conditions.

Congenital anomalies, usually not fatal, are a manifestation of the hereditary nature of diabetes. Diabetic patients themselves have similar anomalies. Hypoglycemia, not a fatal accident, occurs in most newborn infants.

* * *

Thus the outlook for diabetes in the young patient today is good. Duration of life is assured. Progress in prevention and control of complications is advancing. In two periods of life the diabetic patient, like the experimental diabetic animal, shows definite evidence of hormonal in-

*Progynon and Proluton were partly supplied through the courtesy of the Seehring Corporation, Bloomfield, New Jersey.

†The Stilboestrol was supplied through the courtesy of E. R. Squibb and Sons, Company, New York City.

correlation. In the animal this relation appears most marked among the pituitary gland, pancreas and adrenal glands, but in the clinical diabetic patient, when growth and development and pregnancy complicate the disease, an interrelation of gonads, pancreas and pituitary glands is most marked.

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REFERENCES

- 1 Cantilo, E. Successful responses in diabetes mellitus of the menopause produced by the antagonistic action of sex hormones on pituitary activity. *Endocrinology* 28:20-24, 1941
- 2 Brush, J. M. personal communication
- 3 Jackson, R. L., Boyd, J. D. and Smith, T. E. Stabilization of the diabetic child. *Am. J. Dis. Child* 59:332-341, 1940
- 4 Smith, G. V. S. and Smith, O. W. Further quantitative determinations of prolactin and estrin in pregnancy. *Surg., Gynec. & Obst.* 61:27-35, 1935. Evidence for the placental origin of the excessive prolactin of late pregnancy toxemia and pregnancy. *Surg., Gynec. & Obst.* 61:175-183, 1935

DIABETIC HAZARDS*

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PERSONS with sugar in their urines run many hazards. The first is that of being diagnosed a diabetic when the disease is nonexistent. Approximately one seventh of all the patients we have seen with sugar in the urine were thought by us not to have had diabetes at the first visit. One must not be careless with this group. Such patients should have their urines examined every three months for life, warned against overweight and cautioned to report to their physicians if any unusual symptoms occur. In the early days, when blood-sugar tests were not available, 10 per cent of these cases developed diabetes, but more recently the percentage has dropped to 6; it is barely possible that with the more accurate interpretation of glucose-tolerance tests the number of persons who from the experience of the past would later develop diabetes will be still further curtailed, because they will be proved to have had the disease originally.

The glucose-tolerance test itself is a hazard if the patient's diet has previously been restricted in carbohydrate. Such patients, whether or not they have ever shown sugar in the urine, may give a positive reaction to the test. I need not amplify this statement, but simply re-emphasize the necessity of learning from the patients whether they actually have been restricting their carbohydrate before putting them through this procedure. One such case occurred some months ago. A patient with glycosuria came for diagnosis. Sugar was found in the urine, and he was given a glucose-tolerance test. It indicated that he had diabetes, because the blood-sugar level rose above 170 mg. per 100 cc. during the test, and glucose was present in the specimens obtained. Knowing that his diet had been restricted, I advised him to live on a free diet during the continuance of his vacation

and to return in ten days. This he did. A repetition of the test showed the urine to be perfectly normal.

Another diagnostic hazard is the failure to discriminate between pentose or fructose and glucose. We have had 9 such cases. One of these, a child four and a half years of age, had been given insulin for two years. When he arrived for treatment, despite his trip of 1000 miles, the blood sugar was normal. It continued normal for a day or two despite a slight upper respiratory infection. It is true that sugar was present in the urine. However, the technicians followed the established rule that whenever a new patient comes for treatment, pentose must be excluded if the Benedict test is positive. This is very simply done. One performs the Benedict test in the ordinary way, but sets up a duplicate without heat and keeps the mixture of urine and Benedict's solution at room temperature until the following morning. If pentose is present, the Benedict's solution will be reduced even without heat, but of course this will not take place with glucose. Such a reduction of Benedict's solution in the cold also occurs with levulose. You can imagine, therefore, my gratification in being able to tell the parents of the child that diabetes did not exist and that a special diet and insulin were unnecessary. All our cases, and apparently all such cases thus far recorded have occurred in Jews; the origin of those traced by Lasker¹ has been in what was formerly Poland.

An identification card should be in the pocket of every diabetic patient. It is true that with protamine zinc insulin, reactions are less common than heretofore, but they may occur and the patients must not take any chances. On the reverse side of the identification card that we give our patients are rules for the differential diagnosis of an insulin reaction and diabetic coma. To drive home the desirability of an identification card, I was told of a patient far away from New England who was

*Presented at the annual meeting of the New Hampshire Medical Society, Manchester, May 14, 1940

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put in jail; the disease was unrecognized, and death followed. A happier, although somewhat embarrassing result occurred with one of my diabetic clergymen. He was candidating for a church in a new locality, but when he reached the town, woke up to find that he was in jail instead of in the pulpit. Perhaps his life was saved by an identification card or the mute witness of a couple of lumps of sugar in his pocket.

Living alone is truly a diabetic hazard. Each patient should have a close friend. A diabetic patient who has a diabetic twin is fortunate. My diabetic girls are so bright that they sometimes marry doctors, and my diabetic boys so intelligent that they deplete the ranks of the nurses at the New England Deaconess Hospital. Perhaps I should not say so much about the danger of living alone, but I have known of such a method of life resulting in dire catastrophes.

Diabetes should be acknowledged by those who have it. It is not a disease to be ashamed of unless one has been informed that he or she is hereditarily disposed and yet has become fat. One in four of all the people in the country has a diabetic relative. A good share of those who have diabetes could not have prevented it, even if they had avoided obesity, because they were born with a diabetic heredity. If the presence of diabetes is more generally admitted by intelligent patients, people will become more and more accustomed to it and will assume, just as they properly should, that diabetic patients can get along very well and be of service to themselves and others. Meanwhile their friends will allow them to be protected. Diabetic patients often undergo social embarrassments needlessly. Thus they may have taken their insulin, but the expected meal thereafter may be delayed, and a reaction may ensue. Although this is less frequent with protamine zinc insulin than formerly when, with regular or crystalline insulin, injections were made several times a day, reactions do occur. The diabetic woman may be very energetic in preparing the food at a church strawberry festival, and so busy that she forgets the lengthening interval that has occurred between the dose of insulin and the beginning of the meal; a reaction may take place, to the confusion of all concerned. If the disease had been less concealed, the hostess or a friend might have shared in preventing the delay in eating.

Unusual exercise promotes the tendency to a reaction. With regular insulin or crystalline insulin one takes a little extra carbohydrate at the first sign of a reaction, but patients employing protamine zinc insulin will do better if they eat their

extra quota of carbohydrate at the beginning of the exercise.

Gastrointestinal upsets often are the precursors of a reaction. During such episodes, patients should always take some carbohydrate at frequent intervals, electing the form that can be best retained—tea or coffee with sugar, milk and Vichy water, ginger ale or similar preparations.

Automobile driving is a definite hazard. The patient should make it a rule never to drive an automobile unless carbohydrate has been taken within two hours. Of course it is safer for him to have a companion in the car, and that is another reason for not living alone. On the other hand, I wish to state emphatically that I have known diabetic patients who made a practice of driving thousands of miles a year in their daily work and yet never got into trouble. These persons, however, are most reliable. I confess that at one time I knew of a diabetic woman who drove a school bus. It always worried me, but I never had a more reliable patient. She never drove without taking food a very short time before driving, and now that she has given up driving on account of age I can say that she never had an accident; in fact, once when there was an emergency on account of trouble with the automobile, she mastered it. One of my very best patients has been an aviator, but fortunately he is now married and has given up acting as a pilot.

The differential diagnosis of diabetic coma and an insulin reaction is often difficult. I cannot blame the doctor who does not have an opportunity to see many diabetic patients if he fails in such a diagnosis. That is why we ask all our patients to carry an identification card with the points in diagnosis on the reverse side. I have known tragic examples of failure in such a diagnosis. Aside from the standard points of differential diagnosis, what should be done? Recourse must be had to a laboratory.

Laboratories are lifesaving in diabetes because through them the doctor can intelligently treat a patient with an insulin reaction or diabetic coma. Each doctor and each patient should always know where blood-sugar tests and tests for acidosis, including the carbon dioxide content or combining power of the blood plasma, can be performed promptly, not only by day but by night, on Sundays and on holidays. Laboratories cost only about \$200. No town should be without a laboratory in which a blood-sugar test can be done. Doctors must co-operate more and more to make this possible. In one town in Maine there is a diabetic child whose doctor taught the young nurse attendant how to do a blood-sugar test. She has done

tests for years, once a week, for the child. She does tests for the patients of other doctors, and when a case of diabetic coma came to the fourteen-bed hospital in the town, she was the one called on to clinch the diagnosis by estimating the sugar in the blood. I hope that some of my diabetic girls can be trained to be technicians, because then they will demonstrate their usefulness to the communities in which they live.

The omission of the routine test of the urine is dangerous in diabetes. I always dread to have a patient give up testing because for a time he has found his urine constantly sugar free. Of course some patients can rightly do this. The ordinary patient, however, should test the urine daily. Over and over again the rule has been relaxed only to find later that the diet has also been relaxed. Thousands of useless tests are better than the failure to recognize the return of active diabetes with or even without the development of diabetic coma.

A double diagnosis should always be considered in diabetes. A single diagnosis to explain all the symptoms that a patient manifests was the rule we were all taught to adopt in our early medical education. Such a rule, however, is fallacious in diabetes, and double diagnoses are now more frequent. I took off my hat to a young physician, who came to work with us after graduating from the Peter Bent Brigham Hospital, when he diagnosed cerebrospinal meningitis in the presence of an attack of diabetic coma and with prompt, intelligently applied and efficient treatment saved the patient's life. Over and over again this rule holds in diabetic coma. The patient in diabetic coma seldom dies, unless there is an additional diagnosis such as appendicitis, cholelithiasis, pyelitis, paraneurphic, ischiorectal or vulval abscess, coronary thrombosis, uremia, apoplexy or pneumonia. It is safe to assume, when a diabetic patient is not doing well, if his diet is adjusted and if he is taking the usual dose of insulin, that another diagnosis exists; one should always look for the accompanying diagnosis.

Errors in measuring insulin are common. Regardless of whether the patient is a doctor, lawyer or a minister, whether he is a patient who has taken insulin for a week or for ten years, it is possible for such errors to occur. Therefore, it is a good rule always to ask to see the syringe that the patient uses, to check up closely both the type of insulin and how he measures and injects it and never to trust to his story if in any way the diabetes is not being properly controlled when one thinks that it should yield to treatment. To guard against errors in measuring insulin, our group believes that the simplest type syringe, namely, a 1-cc. syringe divided into tenths, is the best. I

considered myself fortunate to be able to tell a doctor, who was health officer of a large city, that his uncomfortable feelings during the latter part of the morning were not due to his circulation, but to the fact that he was taking 60 units of insulin when he thought he was taking 30 units.

Insulin should never be omitted when sugar is present in the urine. The mere fact that a patient is not eating is no reason to omit a dose of insulin. Omit insulin only when the urine is sugar free. Of course, one always checks up the statement that sugar is or is not present in the urine. It may have been secreted from the kidney into the bladder at 2 a.m. and consequently found in the urine when the bladder is emptied at 7 a.m., thus giving rise to the patient's wrong impression that the urine secreted at that particular moment shows sugar. A second specimen test a few minutes later will clear up the situation, provided that the bladder has been thoroughly emptied at the previous voiding. Any patient who improves so much that he can be told that insulin can be omitted must be doubly cautioned to test his urine more frequently in the future than ever before to be sure that the sugar does not return. Unless the doctor does this, he is likely to be embarrassed at a future visit of the patient or by an emergency summons.

Failure to recognize that diabetes can improve and grow milder is a definite hazard. It is almost as serious as failure to recognize that it can grow worse. In one case the failure may lead to an insulin reaction, and in the other to diabetic coma. There are so many mild diabetic patients today who do improve, and such a considerable percentage who by living faithful dietetic lives and taking proper exercise could give up their insulin safely, that it is a shame not to recognize their improvement and enable them to do so.

Toes are a greater hazard than teeth. A diabetic patient can have a toothache, and he will fly to the dentist to have it treated or taken out. But if he has a toe ache, most likely he will neglect it or eventually go to the doctor, who may dress it instead of taking it off. If these patients could only get rid of their toes as easily as they get rid of their teeth, how fortunate they would be. Other lesions of the feet arise in diabetes, resulting in gangrene, but most of the troubles in the feet begin in the toes. Never let a diabetic patient go through a visit in your office unless he takes off his shoes and stockings. This is sometimes a sad and disagreeable procedure for the doctor, but if the feet are always examined, they will be cleaner and cleaner at each subsequent visit, and the time may come when you will be able to trust the removal of one instead of two stockings, although that is a very

risky procedure. I do not dare to look up how much of the free-bed money for diabetic patients in the New England Deaconess Hospital is spent on neglected toes, but I venture to say that the charity money devoted to the toes of elderly patients is five times that expended on diabetic patients in their teens. Consider the difference in the efficiency and expectation of life of the two groups.

A defeatist policy will never win a diabetic war. Always attack diabetes aggressively—the more aggression, the younger the diabetic and the more recent the onset of the disease. Best² has shown that diabetes can be prevented in a dog following the injection of anterior pituitary extract, provided insulin is simultaneously administered. Indeed, if a dog is fasting it is impossible to give it diabetes by the injection of anterior pituitary extract. Lukens³ has shown in a cat that even after two months the diabetes definitely produced by injections of anterior pituitary extract can be

cured by energetic treatment with insulin. In the cat, for some months following the development of the disease, the islands of Langerhans in the pancreas are in the stage of hydropic degeneration, and in that stage the lesions are reversible and the diabetes can be cured.

How thankful I am that the words "prevention" and "cure" have now entered the vocabulary associated with diabetes, even though they apply alone to experimental diabetes in an animal. There is no question in my mind that some of those who hear me today will live to see the extension of these experiments to diabetes in man.

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REFERENCES

1. Lasker, M.: personal communication.
2. Lasker, M., Enklewitz, M. and Lasker, G. W. Inheritance of lipo-ketosuria (essential pentosuria). *Human Biol.* 8:243-255, 1936.
3. Haist, R. E., Campbell, J. and Best, C. H. The prevention of diabetes. *New Eng. J. Med.* 223:607-615, 1940.
3. Lukens, F. D. W. and Dohan, F. C. Morphological and functional recovery of the pancreatic islands in diabetic cats treated with insulin. *Science* 92:222, 1940.

THE TREATMENT OF PNEUMOCOCCAL PNEUMONIA*

With Special Reference to the Use of Sulfathiazole, Intramuscular Serum, the Francis Test and Histaminase

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THE specific therapy of pneumococcal infections has been undergoing changes so rapidly in recent years that careful evaluation of the various types of therapy has been impossible, with the result that there are many uncertainties and differences of opinion concerning relative merits. It is the purpose of the present communication to report experiences with 80 cases of pneumococcal pneumonia that were treated at the Peter Bent Brigham Hospital between October, 1939, and June, 1940.

Detailed statistical analysis of a series of cases of this size is not worth while. The type incidence was not unusual; all but a single case fell into one of the 32 pneumococcal types of Cooper. The average age of our patients, forty-nine years, is considerably above that usually reported. Bacteremia was found in only 10 cases. The gross mortality rate in a small series of cases is not of much significance, since it depends considerably on chance. With the extremely effective agents now available, mortality is rare in ade-

quately treated cases unless the pneumonia is complicated by some other serious debilitating condition, such as heart disease, cancer or chronic alcoholism, or is far advanced when therapy is begun. A brief survey of the 9 fatalities in the present series bears this out.

CASE REPORTS

CASE 1. G. B. (No. 57025), a 70-year-old man, was admitted after several days' illness—the exact duration was uncertain. The blood culture contained many Type 9 pneumococci, estimated at 60,000 per cubic centimeter. The leukocyte count was 5200. Three lobes were involved. The patient was treated with sulfathiazole, concentrated rabbit serum intravenously and blood transfusions (1200 cc.). He died 36 hours after admission. Blood culture just before death showed less than 1 colony per cubic centimeter. Autopsy showed dense consolidation of three lobes, massive empyema, and purulent arthritis of one sternoclavicular joint.

CASE 2. M. D. (No. 57187), a 60-year-old woman and a chronic alcoholic, was admitted in coma, with multiple bruises and a fractured clavicle, following a fall during a drinking spree. The patient was unconscious for 30 hours. On the 4th hospital day, signs of pneumonia (Type 8) developed in two lobes; the patient succumbed 40 hours later. She was treated with sulfathiazole, and concentrated horse serum intramuscularly. Autopsy was not permitted.

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CASE 3. A. W. (No. 562399), was a 51-year-old woman. Since childhood she had had rheumatic heart disease involving the mitral and aortic valves, and had been decompensated previously. Operation, consisting of closure of colostomy following resection of colon for regional ileitis, was performed. The patient developed signs of pneumonia (Type 14) in two lobes on the first postoperative day, and was treated with sulfapyridine and with concentrated rabbit serum intravenously. The response was excellent; the temperature fell to normal and the signs of pneumonia cleared rapidly. On the 8th postoperative day, the patient went into collapse and died rather suddenly. Autopsy showed that the pneumonia was practically gone, but there was a large fresh mycotic aneurysm on a mitral-valve leaflet.

CASE 4. J. F. (No. 57224), a 68-year-old man with a Type 8 infection, was admitted and gave a history of failing health, with insidious onset of respiratory infection followed by pneumonia during two weeks previous to entry. He was found to have lymphatic leukemia, with generalized lymph-node enlargement and splenomegaly; the leukocyte count was 400,000 to 600,000. There were signs of pneumonia in two lobes. The patient was treated with sulfapyridine and concentrated horse serum intramuscularly. There was no response to treatment. The condition steadily became worse, and the patient died on the 7th hospital day, having been stuporous for 3 days. Permission for an autopsy was not obtained.

CASE 5. P. D. (No. 56391), a 45-year-old man with a Type 5 infection, had been followed in the outpatient clinic for many years because of chronic cough, dyspnea and asthma. Previous x-ray and physical examinations had shown marked enlargement of the right side of the heart—cor pulmonale. The patient was admitted to the hospital, gravely ill, on the 4th day of pneumonia and showed extreme cyanosis and dyspnea. He was treated with oxygen and sulfapyridine. He died 5 hours after admission. No autopsy was performed.

CASE 6. C. M. (No. 57214), a 67-year-old man with a Type 3 infection, was admitted on the 6th day of pneumonia. Blood culture on admission contained 50 colonies of Type 3 pneumococci per cubic centimeter. The leukocyte count was 4200. Three lobes were involved. Chest aspiration yielded a small quantity of pus, either from empyema or from a lung abscess. The patient was treated with sulfathiazole, sulfapyridine and concentrated rabbit serum intravenously. He died on the 2nd hospital day. No autopsy was performed.

CASE 7. J. H. (No. 56503), a 73-year-old woman with a Type 3 infection, was admitted on the 7th day of disease; two lobes were involved. There was an old history of hypertension. The patient was treated with sulfathiazole and concentrated rabbit serum intravenously, with no response other than a fall in temperature, and died 55 hours after admission. No autopsy was performed.

CASE 8. C. D. (No. 56309), a 73-year-old man with a Type 4 infection, was admitted with a history of poor health for several weeks; he had been vomiting for 2 or 3 days before admission. He was extremely dehydrated. Examination revealed consolidation of the entire right lung. The patient was treated with sulfapyridine for several days, with no obvious effect on the pulmonary disease. The temperature remained normal throughout his stay in the hospital. On the 14th day his pulse suddenly became rapid and weak, and he died within a few hours. Autopsy

showed an unresolved pneumonia in the right lung, estimated by the pathologist to be of at least 6 weeks' duration. Death probably was due to recent perforation of a gastric ulcer. Incidental findings were carcinoma in the cecum and in the prostate.

CASE 9. G. L. (No. 56837), a 45-year-old man with a Type 3 infection, was admitted on the 5th day of pneumonia with a history of chronic alcoholism. Two lobes were consolidated. The leukocyte count was 1200. The blood culture was positive—50 colonies per cubic centimeter. The patient was treated with sulfapyridine. He showed evidence of peripheral vascular collapse on admission, and died within less than 24 hours. Autopsy showed lobar pneumonia (right middle lobe), bronchopneumonia (left upper lobe), atelectasis of the rest of the lungs, bilateral hydrothorax, fibrinous pericarditis, cholelithiasis and hepatomegaly.

The chemotherapeutic agents used in these cases were sulfapyridine and sulfathiazole.* The anti-pneumococcus serums were chiefly those supplied by the Commonwealth of Massachusetts (concentrated horse serum for Types 1, 2, 5, 7 and 8 and commercial concentrated rabbit serum for Types 4, 9, 14 and 18). Commercial rabbit serums of other types were also available for seriously ill patients. Two patients were treated with a Type 3 concentrated rabbit serum.†

The general plan of treatment was to administer either sulfapyridine or sulfathiazole to all patients, and in addition to give serum to all patients with types of pneumonia for which serum was available. This routine use of serum is at variance with the practice of some authorities,^{1,2} who advocate treatment with drugs alone, resorting to serum only in certain types of cases, such as those not responding to the drug in twenty-four to thirty-six hours and those with bacteremia, renal calculi and so forth. Our reasons for employing serum routinely in addition to the sulfonamides were as follows: there is good evidence, both experimental and clinical, that a combination of chemotherapy and antiserum is more effective against pneumococcal infections than is therapy with either one alone; by giving serum in addition to sulfapyridine, the dosage of the drug can be reduced considerably; it is reasonable to suppose that the less drug that has to be given, the less danger of toxicity; also patients who are not receiving sulfonamides eat better and have a more rapid convalescence.

In these cases the average total dose of sulfapyridine when used alone was 17.8 gm., as compared with 10.2 in patients treated also with serum. For sulfathiazole the respective averages were: 31.2 and 16.7 gm. When both chemotherapy and

*The sulfathiazole and sodium sulfathiazole were supplied through the courtesy of the Squibb Institute for Medical Research, New York City.

†Supplied through the courtesy of the Squibb Institute for Medical Research, New York City.

serotherapy were employed, the plan generally followed was to give sulfapyridine or sulfathiazole as soon as the diagnosis of pneumonia was made. After six to twelve hours of drug therapy, treatment with serum was instituted. The reason for this spacing of therapy was to allow time for absorption of the drug and the attainment of a therapeutic blood level, and to allow for the lag period that probably exists before the bacteriostatic effect of the sulfonamide compound begins to take effect.^{3,4} Then an attempt was made to bring about a critical termination of the infection with serum. As soon as this occurred, all therapy—drug and serum—was stopped. Thus in many cases no therapy was given after the first ten or twelve hours, as is shown by the following typical case.

CASE 10. L. K. (No. 56546), a 51-year-old man with a pneumococcal infection Type 3 and a negative blood culture, was admitted on the second day with involvement of the right upper lobe. Sulfathiazole was begun two hours after admission. A Francis test was negative. Concentrated rabbit serum (150,000 units) was given intravenously 8 hours after admission. Three hours later the Francis test was still negative, and therefore 50,000 units of serum was administered intravenously. Two hours later the Francis test was strongly positive. All therapy was stopped, and the pulse fell from 150 to 95, followed by a more gradual drop in temperature. The total dosage of sulfathiazole was 10 gm. The convalescence was rapid and uneventful.

COMPARISON OF RESULTS WITH SULFAPYRIDINE AND SULFATHIAZOLE

Sulfapyridine has been in general use since the fall of 1938, whereas sulfathiazole, a sulfonamide derivative that is similar to sulfapyridine in its range of antibacterial action, has just been released for general use. Very little has yet been reported as to clinical experience with sulfathiazole in large series of cases. Flippin, Schwartz and Rose² recently reported a comparison of results in 100 patients treated with sulfapyridine and 100 treated with sulfathiazole. They considered the effects of the two drugs to be about the same. In a report to the Council on Pharmacy and Chemistry of the American Medical Association, Long⁵ states that early experience indicates that sulfathiazole is about as effective as sulfapyridine in the treatment of pneumococcal pneumonia.

We have treated 37 pneumonia patients with sulfathiazole, alone or in combination with serum. Naturally, no positive conclusion can be drawn from this experience. There was no response to sulfathiazole in 3 patients in whom the administration of sulfapyridine brought about a favorable termination of the infection. It is possible that there may be similar sulfapyridine-resistant cases

that will respond to sulfathiazole, but we have not seen them; we are therefore inclined to believe that sulfapyridine is slightly more effective.

There are unmistakable differences between the two compounds. Sulfathiazole is more rapidly absorbed and excreted in the urine,⁶ and to obtain satisfactory blood concentrations it is therefore necessary to give larger doses. For that reason, the schedule of dosage followed in most of our cases was 3.0 or 4.0 gm. initially, followed by 1.5 gm. every four hours. The blood concentrations achieved tended to vary, much as they do with sulfapyridine, from 1.5 to 15.0 mg. per 100 cc., and equally good therapeutic responses were obtained at different levels. Determination of free sulfathiazole gives an accurate index of the amount present in the body fluids, because very little is conjugated, whereas some patients on sulfapyridine may have a total blood concentration of 10 mg. with a free level of only 2 mg. per 100 cc. Since the conjugated compounds are very insoluble in the urine and much less effective therapeutically, this lack of conjugation is an advantage.

Sulfathiazole has one decided superiority over sulfapyridine in that it is much less apt to cause nausea and vomiting. Almost none of the headache, dizziness, delirium and general malaise that so commonly accompany sulfanilamide administration are seen with sulfathiazole, and cyanosis is minimal. Among approximately 50 patients who have been given sulfathiazole for various infections, we have seen no patients with blood destruction or agranulocytosis, although more cases must be treated to get valid information on this point.

On the other hand, there are two toxic manifestations that we have observed even in our small series. Two women receiving sulfathiazole developed on the extremities skin eruptions that resembled erythema nodosum, although the lesions were not tender. One of them had a conjunctivitis associated with a burning sensation and photophobia. This type of skin rash and conjunctivitis has been described by Haviland and Long.⁷ The most serious toxic reaction we have encountered involved the kidneys and was characterized by a marked diminution in urine output, associated with albuminuria and, in one case, with many granular casts. In a series of 50 cases of various infections treated with sulfathiazole this reaction has occurred four times in 3 patients. One patient was tried on sulfathiazole twice, and each time his urinary output decreased steadily over a period of forty-eight hours, despite a generous fluid intake. Neither sulfanilamide nor sulfapyridine had this effect. In no case did gross or microscopic hematuria or pain, as reported by Arnett,⁸ give any

warning of the danger, but careful check on the output of urine showed that it was rapidly diminishing, and examination of the urine showed albumin. In these patients, the condition cleared fairly promptly when sulfathiazole was discontinued and fluids were forced in large amounts, but high concentrations of sulfathiazole were excreted for the next few days, often enough to precipitate as a yellow dust from the urine, with crystals visible in the sediment. These crystals under the microscope look like radially striated balls or dumb-bells or like sheaves of sticks. It seems conclusive that fluids should be given in liberal amounts during sulfathiazole therapy, and that a careful check must be maintained on the output of urine. This is particularly true when sodium sulfathiazole is given intravenously to achieve rapidly a high blood concentration. We have without mishap used single intravenous injections of 4 gm. of sodium sulfathiazole in distilled water, given slowly as a 5 or 10 per cent solution, in several patients at the start of therapy. Our limited experience with sulfathiazole seems to be in entire agreement with the larger experience of Long and his associates.⁹

One point noted by Flippin, Schwartz and Rose,² which was also true in our cases, is that sulfapyridine appears to bring the temperature down more rapidly than sulfathiazole. We believe, however, that the effect on the temperature may not be a reliable index of the antibacterial action of the two drugs, since we have evidence, experimental and clinical, indicating that sulfapyridine has an antipyretic action.¹⁰ Consequently, a more rapid drop in temperature does not necessarily mean a more effective antibacterial action.

There is little agreement as yet as to the length of time chemotherapy should be continued in the treatment of pneumonia. Long and Wood¹¹ advised continuation of therapy with sulfapyridine (in diminishing doses) until the patient is ready to leave his bed. They stated that there is considerable danger of relapse if therapy is discontinued too soon. Fox, Rosi and Winters¹² urged that sulfapyridine therapy be continued until agglutinins can be demonstrated in the blood, and they reported demonstration of agglutinins in every one of 50 patients studied. On the other hand, there is evidence that demonstrable free antibody is not essential to recovery from pneumococcal pneumonia. Francis and Tillet¹³ studied patients who recovered from pneumonia without any specific treatment, and reported that in some of them no excess of antibody could be demonstrated. Spring, Lowell and Finland,¹⁴ recently reported inability to demonstrate type-specific agglutinins in the blood of some of their sulfapyridine-treated patients during recovery. Kneeland and Mulliken¹⁵

found precipitins in the blood of only 4 of 19 sulfapyridine-treated cases of pneumonia during the recovery phase. Our policy has been to discontinue drug therapy comparatively early. The average duration of therapy in our cases treated with drug alone was 3.6 days for sulfapyridine and 4.0 days for sulfathiazole. In many of these cases, presence of antibodies in the circulation could not be demonstrated by the Francis test at the time therapy was discontinued. Yet in only one case was it necessary to readminister sulfapyridine because of further activity of infection. Early discontinuance of the drug has the advantage of relieving nausea and improving the appetite of most patients, and of decreasing the likelihood of other more serious toxic effects.

INTRAMUSCULAR SEROTHERAPY

Intramuscular administration of serum has been employed successfully in diphtheria for many years, but has been used little in pneumonia. We believe that the intramuscular route of administration has one great advantage that is worthy of consideration: it practically never causes a chill or a thermal reaction. The disadvantage of intramuscular administration is, of course, the fact that absorption of antibody into the circulation is slow, which probably renders this route of administration considerably less effective than the intravenous one when serum alone is employed. However, antibody can be administered by this route fairly satisfactorily, as illustrated by the following case.

CASE 11. J. B. (No. 57216), a 43-year-old man with a Type 1 pneumonia and a history of arrested pulmonary tuberculosis, duodenal ulcer and renal calculi, was admitted on the 3rd day of his disease; one lobe was involved. Blood culture was negative. Because of the presence of renal calculi, it was decided to treat the pneumonia with serum alone. The Francis test was negative. Three hours after admission, the patient was given 60,000 units of concentrated horse serum intramuscularly. Thirteen hours later, the Francis test was still negative, and he was given 150,000 units of serum intramuscularly. Ten hours after the second injection, the Francis test was found to have become positive. Three hours later the temperature was normal. Recovery thereafter was uneventful, and the patient left the hospital on the 11th day.

Finland and Brown¹⁶ studied the absorption of antipneumococcus antibody after intramuscular administration and were able to find antibody in the circulation as early as two hours after administration; the peak of absorption occurred twenty-four to forty-eight hours later. We have administered serum intramuscularly in conjunction with chemotherapy in 20 cases, and have found the results to be satisfactory in most cases. The amounts of serum given at one time varied from 60,000 to 150,000 units. Most of the serums that were given

intramuscularly were known to cause chills when given intravenously, and doses of this size would almost certainly have caused severe thermal reactions if given by the intravenous route; yet there was not a single chill or rise in temperature in this series of cases. Effective absorption of antibody was demonstrated in most cases by the development of a positive Francis test. It should be emphasized that the intramuscular route is not the ideal one, but may be used to advantage with serums apt to give chills or in patients in whom thermal reactions would be dangerous. The dosage may have to be considerably larger, and we have had a few patients in whom the absorption of horse serum so administered was unsatisfactory. However, in severely ill patients, after chemotherapy has been started, a large dose of serum may be given intramuscularly and later be supplemented with smaller doses of intravenous serum.

THE FRANCIS TEST

The Francis test is a valuable guide in the determination of serum dosage,¹⁷⁻¹⁹ and is performed by injecting 0.1 cc. of a 1:10,000 solution of type-specific pneumococcal capsular polysaccharide intradermally. A positive reaction presumably indicates the presence of free antibody in the circulation. It appears in eight to fifteen minutes and is a typical immediate reaction, with erythema and wheal and pseudopodia formation. The advantage of this test is that it tells one within a few minutes whether or not a patient has an adequate supply of antibody. Thus it is a much more rapid, and in many cases, more accurate indication than a fall in body temperature. Although its main usefulness is in guiding serum dosage, the test may also be used in cases treated with sulfonamides alone, since it becomes positive when the natural antibody makes its appearance. Its greatest drawback is the occurrence of false positive reactions in some persons—some patients show a typical immediate skin reaction to the injection of a pneumococcal polysaccharide, although they have no antibody for that type of pneumococcus. In such a person, it would be thought that sufficient serum had been given after the first test. This danger can be eliminated, however, by testing all patients prior to serum therapy. In those who react positively, the Francis test cannot be used.

In the present series of cases the Francis test was used in 42 patients, and in 4 of these a false positive reaction was encountered. In addition, 3 patients never developed a positive reaction at times when there was good evidence that an excess of antibody was present. In the remaining 35 patients the Francis test was a reliable and useful guide.

In regard to the false negative Francis test, that is, failure to react in spite of the presence of excess of antibody in the circulation, it should be pointed out that the skin must possess the capacity to develop a reaction. Some gravely ill patients lack this capacity. One method of testing for it is to inject 0.1 mg. of histamine (0.1 cc. of a 1:1000 solution of histamine phosphate) into the skin. Failure to react to histamine with erythema and a wheal shows that the skin lacks the ability to give a positive Francis test, and one should be so guided.

Details concerning the use of the Francis test.

Once the type of the pneumococcus has been determined from examination of the sputum or blood culture, 1 cc. of a 1:10,000 dilution of the capsular polysaccharide* of this type is withdrawn into a syringe; if the solution is 1:1000, 0.1 cc. is drawn into a syringe containing 0.9 cc. of sterile saline. A single test dose, 0.1 cc., containing 0.01 mg. of polysaccharide, is injected into the skin of the flexor surface of the forearm; 0.1 cc. of sterile saline may be injected in another site to control the patient's reaction to the trauma of injection. If this initial test gives a positive wheal reaction in fifteen minutes or less, it cannot be used as a guide to serum dosage. If the reaction is negative, as it is in most cases, the test can be used as a guide to therapy, and the syringe containing the polysaccharide dilution should be kept at the bedside.

One hour after each intravenous dose of serum the patient should be retested, and if the reaction remains negative, more serum should be given. As soon as a definitely positive reaction is obtained, no more serum need be administered. If the temperature falls, but then rises again, the patient should be retested. If the test has become negative, more serum should be given; if it remains positive, the temperature is not due to a relapse, but to empyema, infection with another type of organism or some other complication, and no more serum of this type is needed. Fever of 101 or 102°F. frequently occurs on the first or second day following serum administration.

If large doses of serum are given and the test remains negative, 0.1 mg. of histamine should be injected intradermally. If this produces no wheal and erythema, it can be concluded that the patient is too ill to give a positive skin reaction to any form of irritation, and the test will not be valid until the patient's condition improves.

It must be emphasized that the test depends on accurate bacteriologic work. If the sputum is wrongly typed, the test means nothing, since the polysaccharide injected is not that of the actual in-

*Solutions of the specific capsular polysaccharides are now commercially available.

fecting type. One should always remember that mixed infections with two pneumococcal types or with pneumococci and hemolytic streptococci may occur, that laboratories are fallible and that if a patient's course is unsatisfactory, another sputum typing and blood culture are indicated.

The practical utility of the Francis test is illustrated by the following case:

CASE 12. A. W. (No. 56518), a 41-year-old man with a Type I pneumonia, was admitted on the 1st day of disease. One lobe was involved. Blood culture was negative.

HISTAMINASE FOR THE PREVENTION OF SERUM SICKNESS

Foshay and Hagebusch¹⁰ recently reported encouraging results in the treatment of serum sickness by the use of histaminase. We were unable to confirm this in the present series of cases. Histaminase* was given both orally and intramuscularly, in doses equal to or greater than those used by Foshay and Hagebusch. The plan followed was to begin therapy with histaminase on the

TABLE 1. *Prophylactic Use of Histaminase for Serum Sickness.*

PATIENT	AGE yr.	TYPE	AMOUNT OF SERUM units	HISTAMINASE units	SERUM SICKNESS
C R	47	1	240 000 i m	1 b i d, i m	None
R C	34	1	60 000 i m	1 b i d, i m	None
P F	30	1	60 000 i v 120 000 i m	1 b i d, i m	None
A deV	50	1	150 000 i m	2 b i d, i m	None
L S	13	1	90 000 i m	1 b i d, i m	Fever 4 days, arthralgia 3 days urticaria 1 day
M W	66	1	70 000 i v 90 000 i m	2 b i d, i m	Fever 3 days, arthralgia 3 days urticaria 3 days
I M	57	14	100 000 i v	75 daily, orally	None
D Mack	58	5	135 000 i m	75, daily, orally	None
E O	43	4	120 000 i v	75 daily, orally	None
C C	55	1	150 000 i m	75 daily, orally	None
H McG	19	1	120 000 i m	45 daily, orally	None
D C	72	8	80 000 i m	45 daily, orally	Fever 1 day
I C	72	8	40 000 i v	45, daily, orally	Fever 3 days
A W	41	1	180 000 i m	45 daily, orally	Fever 3 days, arthralgia 5 days urticaria 4 days
A M	37	1	30 000 i v 90 000 i m	45 daily orally	Arthralgia 3 days
C M	63	6	70 000 i v	None	None
J B	43	1	210 000 i m	None	None
F S	37	8	240 000 i m	None	Fever 2 days, arthralgia 3 days, urticaria 2 days
S E	49	2	200 000 i m	None	None
L K	50	3	100 000 i v	None	None
V V	45	1	60 000 i m	None	None
D N	54	1	270 000 i m	None	None
K F	45	3	50 000 i v.	None	None
V F	24	5	40 000 i v 80 000 i m	None	None
F L	86	8	60 000 i m	None	Fever 1 day
J. C	17	5	120 000 i v	None	Fever 2 days, arthralgia 2 days, urticaria 1 day

Therapy with sulfathiazole was begun one hour after admission. The Francis test was negative. Twelve hours later, 60,000 units of concentrated horse serum was injected intramuscularly. Nine hours later the Francis test was still negative, and 60,000 units of serum was injected intramuscularly. Four hours later the Francis test was still negative, and a third dose of 60,000 units of serum was therefore given intramuscularly. Four hours later the Francis test was strongly positive. All therapy, drug and serum, was discontinued. The temperature fell to normal during the next ten hours, but on the next day it rose to 102°F. The Francis test was repeated, and was found to be still strongly positive. With the evidence of excess antibody present in the circulation, it was considered unnecessary to administer more sulfathiazole or serum. This proved correct, since the temperature again fell to normal. The patient's convalescence was impeded by the occurrence of serum sickness, after which he made a good recovery and was discharged on the 24th day.

fifth day following serum administration, and continue it through the tenth day. In the event of development of serum sickness, histaminase therapy was continued until symptoms subsided. As shown in Table 1, there is no evidence that in our cases histaminase had any effect in preventing serum sickness. Its incidence in treated cases happened to be slightly greater than in those patients who did not receive histaminase.

CONCLUSIONS

Experiences in the chemotherapy and serotherapy of pneumonia are reviewed.

Sulfathiazole is comparable to sulfapyridine in

*Histaminase (Torantin) was supplied through the courtesy of the Department of Medical Research, Winthrop Chemical Company, New York City.

its effectiveness against pneumococcal pneumonia. It has the advantage of causing less nausea than sulfapyridine. The urinary output must be carefully watched during its administration, since suppression of urine was the commonest toxic manifestation encountered.

In the majority of cases it is not necessary to continue chemotherapy until the time when liberation of antibodies is expected to take place. Relapse seldom occurs if therapy is discontinued after three to four days.

The combined use of chemotherapy and serotherapy is recommended as the most satisfactory form of treatment in severe pneumonia.

Intramuscular administration of serum has the advantage of avoiding thermal reactions, and in conjunction with chemotherapy it appears to be a practical procedure in many cases.

The Francis test properly controlled is a valuable aid in the estimation of serum dosage.

Histaminase has not been found to have any action in preventing the occurrence of serum sickness.

REFERENCES

1. Finland, M., Lowell, F. C. and Spring, W. C., Jr. Clinical and laboratory studies on the use of serum and sulfapyridine in the treatment of the pneumococcal pneumonias. *New Eng. J. Med.* 222:739-747, 1940.
2. Flippin, H. F., Schwartz, L. and Rose, S. B. The comparative effectiveness and toxicity of sulfathiazole and sulfapyridine in pneumococcal pneumonia. *Ann. Int. Med.* 13:2038-2049, 1940.
3. Whitby, L. E. H. Chemotherapy of bacterial infections. *Lancet* 2:1095-1103, 1938.
4. Clandler, C. A. and Janeway, C. A. Observations on the mode of action of sulfanilamide in vitro. *Proc. Soc. Exper. Biol. & Med.* 40:179-184, 1939.
5. Long, P. H. Thiazole derivatives of sulfanilamide: sulfathiazole and sulfamethylthiazole. *J. A. M. A.* 114:870, 1940.
6. Sadusk, J. F., Jr., Blake, F. G. and Seymour, A. Observations on the absorption, excretion, diffusion, and acetylation of sulfathiazole in man. *Yale J. Biol. & Med.* 12:681-696, 1940.
7. Haviland, J. W. and Long, P. H. Skin, conjunctival and scleral reactions in the course of therapy with sulfathiazole. *Bull. Johns Hopkins Hosp.* 66:313-318, 1940.
8. Arnett, J. H. Hematuria from sulfathiazole therapy in pneumonia. *J. A. M. A.* 115:362, 1940.
9. Long, P. H., Haviland, J. W., Edwards, L. B. and Bliss, E. A. The toxic manifestations of sulfanilamide and its derivatives. *J. A. M. A.* 115:364-368, 1940.
10. Beeson, P. B. and Janeway, C. A. Antipyretic action of sulfapyridine. *Am. J. M. Sc.* 200:632-639, 1940.
11. Long, P. H. and Wood, W. B., Jr. Observations upon the experimental and clinical use of sulfapyridine. II. The treatment of pneumococcal pneumonia with sulfapyridine. *Ann. Int. Med.* 13:487-512, 1939.
12. Fox, W. W., Rosi, R. and Winters, W. L. The Sabin agglutination test as a control of the sulfapyridine treatment of pneumonia. *Am. J. M. Sc.* 200:78-84, 1940.
13. Francis, T. Jr. and Tillett, W. S. Cutaneous reactions in pneumonia: the development of antibodies following the intradermal injection of type-specific polysaccharide. *J. Exper. Med.* 52:573-585, 1930.
14. Spring, W. C., Jr., Lowell, F. C. and Finland, M. Studies on the action of sulfapyridine on pneumococci. *J. Clin. Investigation* 19:163-177, 1940.
15. Kneeland, Y., Jr. and Mulliken, B. Antibody formation in cases of lobar pneumonia treated with sulfapyridine. *J. Clin. Investigation* 19:307-312, 1940.
16. Finland, M. and Brown, J. W. The absorption of pneumococcal antibody after intramuscular injection of antipneumococcal horse and rabbit serums. *J. Immunol.* 35:245-270, 1938.
17. MacLeod, C. M., Hoagland, C. L. and Beeson, P. B. The use of the skin test with the type-specific polysaccharides in the control of serum dosage in pneumococcal pneumonia. *J. Clin. Investigation* 17:739-744, 1938.
18. Edwards, J. C., Hoagland, C. L. and Thompson, L. D. Type specific polysaccharide skin test in serum therapy of pneumonia. *J. A. M. A.* 113:1876-1880, 1939.
19. Wood, W. B., Jr. The control of the dosage of antiserum in the treatment of pneumococcal pneumonia: clinical application of Francis skin test. *J. Clin. Investigation* 19:105-121, 1940.
20. Foshay, L. and Hagebusch, O. E. Histaminase in the treatment of serum sickness. *J. A. M. A.* 112:2398-2402, 1939.

PAIN ASSOCIATED WITH RENAL APLASIA*

Report of Two Cases

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DURING the past year on the Urological Service of the Massachusetts General Hospital we have encountered two rather interesting and unusual cases of pain associated with congenital aplasia of the kidney.

CASE REPORTS

CASE 1. A 14-year-old girl was first seen in the Emergency Ward on July 26, 1939, complaining of frequent episodes of cramplike, right-sided abdominal pain of 6 weeks' duration. The pain was occasionally associated with epistaxis, headache, anorexia and malaise. Two days before admission, the attacks became more frequent, and the pain assumed a sharp, lancinating character, radiating to the right lower quadrant. There was slight burning and frequency on micturition, and nocturia thrice. Pain was aggravated by walking, running and stooping, and was somewhat alleviated by pressure over the tender area in the right upper quadrant.

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Physical examination revealed moderate right costo-vertebral tenderness and diffuse tenderness in the right flank and right upper quadrant. Urinalysis was negative. The leukocyte count was 10,000, the blood pressure 116/65. The nonprotein nitrogen of the blood serum was 17 mg. per 100 cc. The temperature, pulse and respirations were normal. An intravenous pyelogram revealed a hypertrophic, normally functioning left kidney that was incompletely rotated (Fig. 1). No kidney was visible on the right, and there was no excretion of dye on that side. Cystoscopy showed a normal bladder and normal ureteral orifices. The right ureter was catheterized, and obstruction encountered 24 cm. from the bladder. Skiodan was injected and failed to reveal a kidney on that side, the dye returning down the ureter. It was thought that the patient probably had a cut-off aplastic right kidney, but that this was not responsible for her pain.

The patient was discharged and returned six weeks later with a story of recurrent attacks of pain. Physical and laboratory findings were unchanged. Extensive studies were carried out, including a gastrointestinal series, barium enema, Graham test and psychiatric and orthopedic consultations, all of which revealed no evidence of disease. The x-ray films were reviewed, and it was

believed that the patient's symptoms might be due to the presence of a horseshoe kidney with a cut-off right segment. Because other evidence of disease was lacking, it was decided to explore the right kidney.

At operation, what appeared to be a normal ureter was

fat and fibrous tissue measuring 8 by 4 by 2 cm.; the mass contained numerous gray, smooth, transparent cysts measuring up to 3 cm. in diameter and containing a clear, straw-colored fluid. On section the cut surface presented a firm gray fibrous appearance, with no normal kidney tissue.

The microscopic report was as follows:

Scattered through a dense fibrous-tissue stroma, there are large and small tubular structures, some slightly papillary, lined by a layer of cuboidal epithelium; in many places these have smooth muscle walls. These tubules are very probably remnants of the Wolffian ducts. There are also many smaller tubules, some filled with pink-staining casts, which are very similar to the colloid filled tubules seen in chronic pyelonephritis. No definite glomeruli are identified. The stroma in places is very vascular (Fig. 2).

Convalescence was uneventful. The patient was discharged in good condition on the 11th postoperative day. She has been followed in the Out Patient Department for 3 months and is entirely asymptomatic so far as her former complaints are concerned. She is in excellent general health.

CASE 2. A 25-year-old store clerk was admitted to the Urological Service of the Massachusetts General Hospital because of pain in the left back of 2 years' duration. The pain was dull and aching and was localized to the left costovertebral region. It was exaggerated by bending forward and was almost constantly present.

Physical examination was entirely negative except for moderate left costovertebral tenderness. A gastrointestinal series done 9 months before admission was reported negative. On excretory pyelography, there was prompt ex-

observed. When freed up, this was found to be under tension and to degenerate into a fibrous cord attached above to a rounded body, 8 cm. in length, that consisted

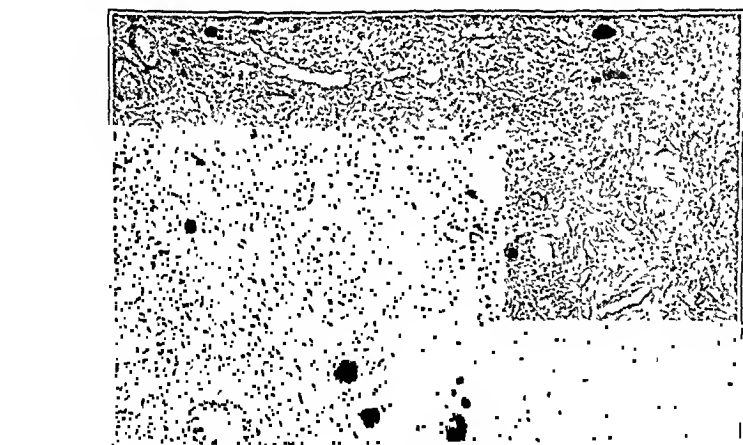


FIGURE 1.

FIGURE 2.

of a mass of smooth cysts filled with clear fluid. There was a definite artery running to the mass from the region of the aorta. This was tied and cut, and the cystic body, with the ureter as far as the pelvic brim, removed. The pathological report described an irregular mass of

cretion of the intravenous dye from the right side, filling a slightly dilated pelvis and ureter (Fig. 3). There was a very questionable kidney shadow on the left, with no excretion of the dye on that side in 60 minutes. Cystoscopy revealed a normal bladder and normal ureteral orifices.

A ureteral catheter engaged in the left orifice but could not be passed farther than 5 cm, and no dye could be injected past this obstruction; a catheter was easily passed to the right kidney, and a normal drip of clear urine ob-

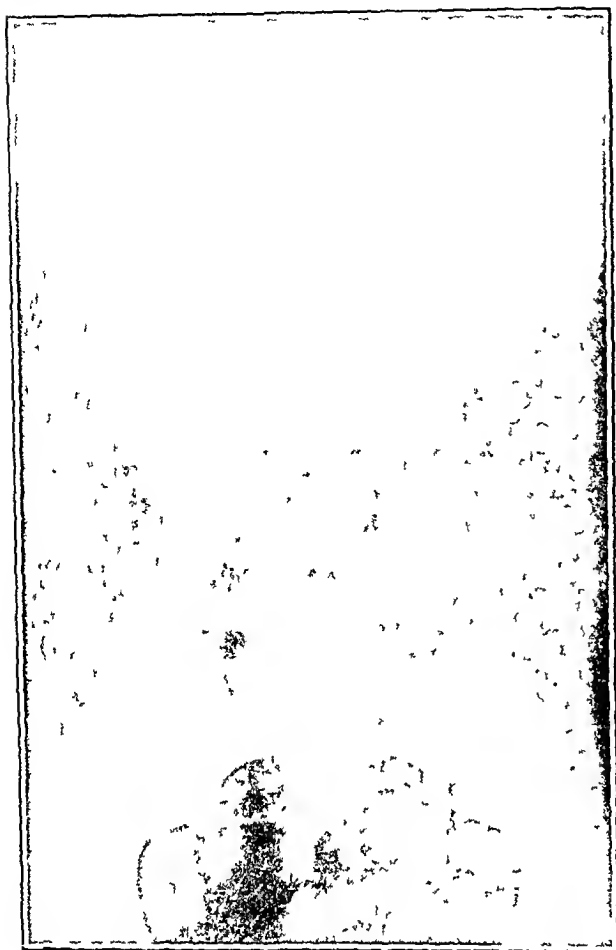


FIGURE 3.

tained (Fig. 4). Since the patient was unable to carry on his work because of the discomfort, it was decided to explore the left renal region on the possibility that the pain was due to an atrophic blocked kidney.

At operation no ureter was seen, but in its place was a fibrous cord that terminated about the level of the 2nd lumbar vertebra. Exploration of the renal fossa revealed a small, flat, brownish body measuring 5 by 4 by 1 cm. and studded with 4 or 5 small purplish cysts. This mass was attached to a fibrous pedicle that contained several small sclerotic vessels. The pedicle was clamped, cut and tied, and the mass removed in toto. What appeared to be a normal adrenal gland was felt above this body. A diagnosis of aplastic kidney was made by the pathologist. Microscopic examination revealed findings similar to those of Case 1. The tubules, however, were much larger and more numerous, and the colloid-filled small tubules less conspicuous; no glomeruli were observed (Fig. 5).

The postoperative course was uneventful. The wound healed by first intention, and the patient was discharged entirely asymptomatic on the 11th postoperative day. At the present time, 5 months after operation, he has had no recurrence of his previous symptoms and is in excellent health.

These two cases exemplify congenital defects or arrest in development of one kidney associated with hypertrophy of its mate. They are differentiated from congenital hypoplasia of the kidney in that at no time have they possessed excretory function. The etiology of the pain in both cases is rather obscure; it may perhaps be explained by the pressure of the cystic bodies on the surrounding tissues, or as in the first case, by tension on the obliterated ureter.

This rare condition has been observed occasionally at post-mortem examination. Campbell¹ reported 39 cases of renal aplasia in a series of 13,000



FIGURE 4.

autopsies at Bellevue Hospital and claimed that its incidence is four times that of congenital absence of the kidney.

Clinically this condition is seldom encountered. MacKenzie and Hawthorne² reported three cases similar to the above in which excision of a cystic aplastic kidney produced permanent relief of symptoms. Gutierrez,³ in an interesting discussion of the developmental defects of the kidney, postulates the following conditions in true renal aplasia: no true kidney; no evidence of pelvis; absence of true renal pedicle; renal artery small or absent; ureter incompletely developed and not patent; no excretion of urine; no renal function; bladder with

no normal ureteral orifices or one ectopic ureter; histologic section of the supposed renal mass reveals glomeruli and tubules showing arrest in the development of the renal organ; cystoscopy, catheterization of the ureters and descending or as-

substance, although no definite kidney outline could be seen.

CONCLUSIONS

Abdominal pain in certain rare cases is associated with congenital aplasia of the kidney;



FIGURE 5.

ending pyelography are necessary for diagnosis of the condition. This author reports two cases of renal aplasia. In one, the preoperative diagnosis was made by observing four small pea-sized shadows in the excretory urogram that gave the impression that the dye had been excreted by some kidney

surgical intervention results in complete relief of symptoms.

REFERENCES

- 1 Campbell, M. F. Congenital absence of one kidney unilateral renal agenesis *Ann Surg* 88:1039-1044, 1928
- 2 Mackenzie, D. W. and Hawthorne, A. B. Unilateral renal aplasia *Surg., Gynec & Obst.* 46:42-51 1928
- 3 Gutierrez, R. Surgical aspects of renal agenesis *Arch Surg* 27,686-735, 1933

INTUSSUSCEPTION OF THE JEJUNUM DUE TO CARCINOID TUMOR

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ABOUT 75 per cent of the cases of intussusception occur in children under two years of age,¹ although a specific cause for the production of the invagination in children is usually not found. Perrin and Lindsay² found only 18 patients over fourteen years of age in a series of 314 cases collected at the London Hospital from 1903 to 1920.

In adult cases of intussusception, a tumor is the commonest etiologic agent. Eliot and Corscaden,³ in their analysis of 300 cases of intussusception in adults, found a tumor of the bowel in 40 per cent of the cases, of which the greater number were benign. Other causes were ulceration of the bowel of tuberculous, bacillary or typhoid origin in 14 per cent, and a Meckel's diverticulum in 12 per cent. Among the tumors usually found were polyps, leiomyomas, lipomas, fibromas and carcinomas.

Tumors of the small intestine are relatively infrequent as compared with tumors of the other parts of the gastrointestinal tract. Raiford⁴ in 1932, in a very full discussion of tumors of the small intestine, reported a series of 88 cases found among 11,500 autopsies and 45,000 surgical specimens at the Johns Hopkins Hospital. He was also able to collect from the literature 339 tumors of the small intestine that he considered authentic. The 88 cases comprised 8.9 per cent of the total number of gastrointestinal tumors, which was 986. The 50 benign and 38 malignant small intestinal tumors comprised 23.8 per cent and 4.9 per cent respectively of the total benign tumors (210) and total malignant tumors (776) of the gastrointestinal tract. The benign tumors included adenomas, fibromas, myomas, lipomas, angiomas, pancreatic rests, hemangiomas, argentaffin (carcinoid) tumors and cysts. In this series the carcinoid or argentaffin tumors numbered 7, and were all benign.

Tumors of the small intestine often produce no symptoms, and are found only incidentally at autopsy. The symptoms that they do produce are usually the result of obstruction of the intestine, incomplete or complete, or of the production of an intussusception.

Freilich and Coe⁵ were able to collect from

the literature a total of 3284 cases of intussusception, of which 462 were enteric; and of these, 24 were jejunal. Altogether, from 1852 to 1934, 29 recorded cases of jejunal intussusception occurred in patients from four months to sixty-seven years old, with an average age of 27; 15 cases were in men, 13 in women, and 1 not specified; 18 were of a simple jejunojejunal type, 9 were double jejunal, and 2 were triple jejunal. The majority were caused by such tumors as polyps, lipomas and papillary adenomas. No case of jejunal intussusception due to a carcinoid tumor was listed.

No specific character of the carcinoid tumor, as compared with other tumors, makes it less likely to produce an intussusception. The relative rarity of carcinoid tumors probably accounts for the paucity of such occurrences. In 1930, Cooke⁶ collected from the literature 104 cases of carcinoid tumor of the small intestine, and added 11 of his own. Ariel,⁷ in the most recent review of the subject, found 111 cases in the literature since 1930, and reported 11 additional cases, thus making the total of reported cases 237.

Among these 237 carcinoid tumors, only 3 cases of intussusception occurred. These were reported by McGlannan and McCleary,⁸ Jones⁹ and Ariel.⁷ In all 3 the tumor was located in the ileum.

Because of the extreme rarity of its occurrence, a recent case of intussusception of the jejunum due to a carcinoid tumor is worth reporting.

Since no new features of pathologic histology appeared in this case, no lengthy description of carcinoid tumors will be given. During the last thirty years, since the name "carcinoid" was given to these tumors by Oberndorfer,¹⁰ a considerable literature has accumulated on the subject. Excellent contributions to and reviews of the problems of pathogenesis have appeared, together with adequate descriptions of the clinical features; for these the reader is referred to the papers of Masson,¹¹ Forbus,¹² Cooke,⁶ Raiford,¹³ Bailey,¹⁴ Humphreys¹⁵ and Ariel.⁷ The work of Masson, particularly, has thrown light on the origin of these tumors from the Kultschitzky cells in the wall of the crypts of Lieberkuhn and on the relation of these cells to those of the chromaffin system and to the nerve plexuses of the intestinal wall. The demonstration of the identity of the

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silver-staining granules in the cells of these tumors with those in the Kultschitzky cells was chiefly due to the researches of Masson, and the term "argentaffin tumor" as a synonym of carcinoid tumor was therefore introduced.

These yellowish tumors were referred to as carcinoids by Oberndorfer¹⁰ because of their superficial similarity to true carcinoma. They were at first considered to be essentially benign. But as increasing numbers were reported, many cases with unmistakable metastasis were found, as evidenced by extension to the regional lymph nodes, mesenteric fat and liver. In Cooke's⁶ series of 115 cases, 21, or 18 per cent, had metastasized. In Ariel's⁷ series of 111 reported cases, 33, or 30 per cent, had metastasized, and among his own 11 cases, metastases were found in 5. Thus, metastases occurred in 59, or 25 per cent, of the 237 cases recorded to date.

The decision as to where the line should be drawn between benignity and malignancy in these tumors is a difficult one, except when metastases actually occur. Thus Humphreys¹¹ states, "The small submucous nodule is certainly a clinically insignificant lesion, and yet it already shows an infiltrative manner of growth which, in a gland cell tumor, is one of the criteria of malignancy." This tendency to invade the muscle and serous layers of the intestinal wall, and to extend out into the mesentery, warrants a diagnosis of carcinoma even in the absence of demonstrable metastases in the lymph nodes or liver. Furthermore, even in the absence of invasive features, the appearance and arrangement of the cells may suggest carcinoma to the experienced pathologist.

In most cases, carcinoid tumors are of slow growth, and are slow to metastasize. This lends a good prognosis to cases that have produced early clinical manifestations, and resection is likely to be followed by favorable results. That the carcinoid tumor is a far from harmless lesion, however, is emphasized by Ariel,⁷ who found that of 38 patients with clinical symptoms produced by carcinoid tumors, 14 died as the result of the tumors or their metastasis, or of attempts at extirpation. Of the 38 patients, 13 were subjected to resection, and were well for varying periods.

Resection is the treatment of choice. The value of x-ray therapy has not yet been evaluated, although the recession of a local recurrence in one case led Ariel to believe that these tumors might be radiosensitive.

CASE REPORT

M B, a 19-year-old girl, was admitted to the Beth Israel Hospital on May 5, 1939. The past history was noncontributory.

About two weeks prior to entry she had had a sudden onset of epigastric colicky pain and vomiting, which continued intermittently for the next 3 days. Enemas afforded temporary relief. Subsequently the patient seemed well until 11 a.m. of the day of admission, when she was again suddenly seized with severe colicky pain in the epigastrium, and to the left of the umbilicus. She vomited 3 times, and complained of persistent nausea. The bowels moved once.

On examination, the patient appeared pale, and in obvious distress from severe pain. The abdomen was not distended, but a rounded fullness was visible just to the left of the umbilicus. Palpation at this site revealed a mass that was rounded in shape, about the size of an orange, tensely elastic, immovable and moderately tender. There was no tenderness elsewhere in the abdomen, and the abdominal wall was generally soft. Pelvic and rectal examinations were negative. The temperature was 98.6°F, the pulse 80, and the blood pressure 134/85.

Examination of the blood showed a red cell count of 4,340,000, with 90 per cent hemoglobin, and a white cell count of 13,000, with 85 per cent segmented polymorphonuclears, 5 per cent young polymorphonuclears, 8 per cent lymphocytes and 2 per cent monocytes. The urine was normal. The sedimentation rate was 7 mm in 45 minutes. Examination of the stools revealed no blood.

The preoperative diagnosis was acute intestinal obstruction, due either to a strangulated paraduodenal hernia or to an intussusception.

Operation was performed about 8 hours after the onset of acute pain. Under spinal anesthesia, a 5 inch left paramedian muscle splitting incision was made. When the peritoneum was opened, a large sausage shaped mass of intestine, fully 10 cm in diameter and over 30 cm in length, was found occupying the epigastrium and left paraumbilical region, it appeared purplish, and exceedingly tense. The entire mass was delivered from the wound. It was identified as a jejunojejunal intussusception. The terminal portion of the mass abruptly changed to collapsed, narrow jejunum. At the proximal end, the intussuscepted jejunum was markedly constricted, and the accompanying mesentery appeared twisted, edematous and ecchymotic. Reduction of the intussusception was effected after considerable difficulty, rupture of the distended, thinned-out intussuscepted bowel being a constant hazard. After reduction, the intussuscepted bowel was found to be the site of a tumor, readily visible at a constricted, retracted segment of the intestine and showing a depression or umbilication on the serosal surface. Palpation revealed a firm mass, about 5 cm in diameter. The mesentery proximal to the tumor had accompanied the intussuscepted intestine, and as a result appeared traumatized, ecchymotic and edematous, with some question of the patency of its blood vessels. There were numerous enlarged, but soft, lymph nodes in this portion of the mesentery. No metastases in the liver or omentum could be seen or felt.

The entire intussuscepted length of intestine, including the tumor and the involved mesentery, was resected, altogether about 20 cm. The ends of the divided jejunum, held by Payr clamps, were closed with an inverting suture of chromic catgut and two purse string sutures of Pagenstecher linen. The two portions of jejunum were then apposed, the closed ends adjacent to each other, and a side-to-side anastomosis made in the usual manner, using chromic catgut for the through and through suture, and Pagenstecher linen for the outer serosal suture. The bowel was then returned to the peritoneal cavity,

and the abdominal wound closed in layers, without drainage.

The pathological report by Dr. Alfred Plaut was as follows:

The resected specimen of the jejunum is 20 cm. long. About 3.5 cm. from the one end, on the antimesenteric side, the lumen is almost occluded by a flat, ovoid, irregular, mushroom-shaped formation, 5.3 by 3.0 by

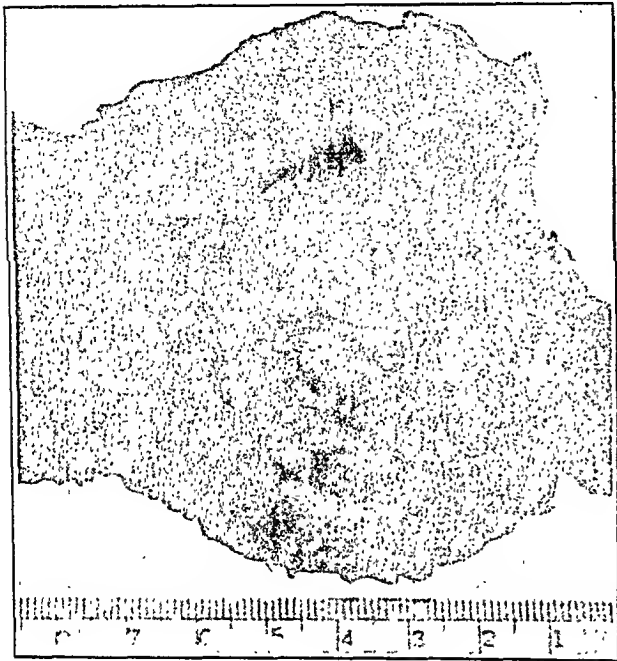


FIGURE 1. *Gross Specimen.*

Flat, ovoid, mushroom-shaped tumor occluding the lumen of the jejunum.

1.0 cm. [Fig. 1]. Somewhat eccentrically, there is a depression in the center of which a small elevation is situated. The depression measures 1.7 by 1.2 cm.

The surface of the tumor in general is smooth and finely granular, with some brownish material adherent to it. There is one small, ovoid, deep-red elevation at the edge. The mucosa directly outside the tumor appears normal. There is very little thickening of the muscle coat. The mucosa in the remainder of the specimen is hyperemic and edematous. No ulceration or necrosis is seen with the naked eye.

On the outside, corresponding to the tumor, the serosa is partly yellowish, partly cyanotic. There is an irregularly ovoid transverse depression. The serosa has lost its sheen throughout. The cut edge of the tumor is homogeneously grayish (after fixation).

Microscopically, the tumor tissue is entirely necrotic on the surface, and considerably necrotic throughout, so that proper cytological studies cannot be made. The cells are not very closely packed. The stroma contains very few cells except those due to the inflammatory reaction caused by the necrosis. There are few blood vessels.

The tumor is situated chiefly in the submucosa, but the mucosa is widely invaded [Fig. 2]. The muscle coat is partly destroyed by the tumor. In the muscle coat a linear arrangement of the tumor cells is distinct. The cells are medium sized, with large nuclei [Fig. 3].

Many fragments of nuclei are seen in the necrotic areas. None of the lymph nodes contain tumor.

Diagnosis: malignant carcinoid.

The patient's postoperative course was uneventful. She was treated immediately with an indwelling Levine



FIGURE 2. *Low-Power Magnification.*

Diffusely growing tumor cells separating the glands of the mucosa.

tube, no liquid or food by mouth, continuous intravenous drip of 5 per cent glucose in physiologic saline solution or distilled water, adequate sedation, and sulfanilamide intravenously and by hypodermoclysis. Fluid by mouth

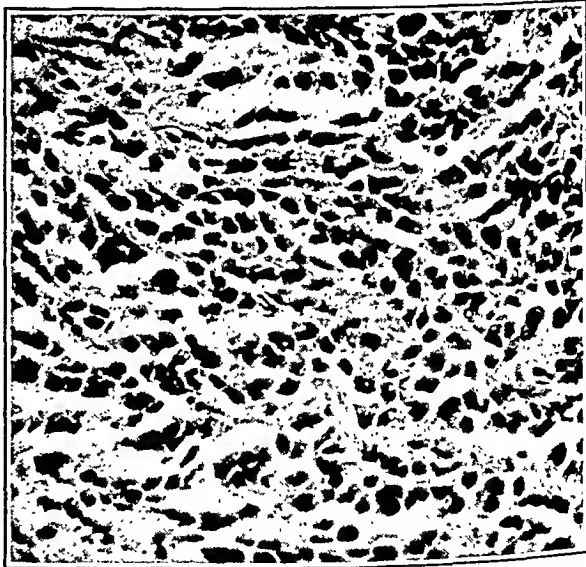


FIGURE 3. *High-Power Magnification.*

The protoplasm of the tumor cells cannot be well recognized. The nuclei seem far away from each other (shrinking). No definite architecture is recognizable.

was started on the 2nd postoperative day, and sulfanilamide discontinued at the end of the 3rd day, a blood concentration of 5.5 mg. per 100 cc. having been obtained.

Except for drowsiness, cyanosis and moderate nausea attributable to the sulfamidamide, the subsequent course was entirely uncomplicated. The abdomen was soft and not distended. The temperature rose to 102.2°F on the day following operation, and thereafter gradually descended to normal on the 6th day.

The wound healed by primary union. The patient was up and about for several days, and was discharged from the hospital on the 17th postoperative day.

When last examined, 8 months after operation, the patient was quite well. Except for three or four occasions when she experienced moderate abdominal dull pain and discomfort with no associated nausea or vomiting, which were quickly relieved by enema, she had had no symptoms suggesting any disorder related to the disease for which she was operated on. Physical examination was entirely negative, the operative scar was firm, and the abdomen was soft and nontender throughout, with no palpable organs or mass.

CONCLUSIONS

Cases of intussusception due to carcinoid tumors are extremely rare.

The case reported appears to be the first record of a carcinoid tumor causing an intussusception of the jejunum.

Carcinoid tumors are more frequently malignant than has been usually assumed, although the rate of progression is slow.

Resection of the involved intestine offers an ex-

cellent prognosis for permanent cure, in the absence of distant metastases of the lymph nodes or liver.

REFERENCES

- Wangenstein O H. *The Therapeutic Problem in Bowel Obstructions: A physiological and clinical consideration*. 300 pp. Springfield, Illinois: Charles C Thomas, 1937. P. 281.
- Perrin D S and Lindsay E C. Intussusception: a monograph based on four hundred cases. *Brit J Surg* 9:46-71, 1921.
- Flint E Jr and Corscaden J A. Intussusception with special reference to adults. *Ann Surg* 53:169-222, 1911.
- Raiford T S. Tumors of the small intestine. *Arch Surg* 25:122-177, 1921.
- Freilich E B and Coe G C. Jejunal intussusception. *Ann Surg* 105:183-191, 1937.
- Cooke H H. Carcinoid tumors of the small intestine. *Arch Surg* 22:568-597, 1931.
- Ariel I M. Argentaffin (carcinoid) tumors of the small intestine: report of eleven cases and review of literature. *Arch Path* 27:25-52, 1929.
- McGinnin A and McCleary S. Carcinoid tumors of the small intestine: report of a case complicated by intussusception in an adult. *JAMA* 89:850-852, 1927.
- Jones C B. Argentaffin cell tumors (carcinoids) of small intestine and appendix. *Am J Surg* 34:294-299, 1936.
- Oberndorfer S. Karzinoid-Tumoren des Dünndarms. *Frankfurt Ztschr f Path* 1:426-432, 1907.
- Vasson P. La glande endocrine de l'intestin chez l'homme. *Compt Rend Acad d sc* 158:59-61, 1914. Les lésions nerveuses de l'appareil digestif chronique. *Ibid* 173:262-264, 1921. Carcinoids (argentaffin cell tumors) and nerve hyperplasia of the appendicular mucosa. *Am J Path* 41:181-211, 1928. Contribution to the study of the sympathetic nerves of the appendix: the musculoneurotic complex of the submucosa. *Ibid* 6:217-233, 1930. The significance of the muscular stroma of argentaffin tumors (carcinoids). *Ibid* 6:499-514, 1930.
- Forbush W D. Argentaffin tumors of the appendix and small intestine. *Bull Johns Hopkins Hosp* 37:130-153, 1925.
- Raiford T S. Carcinoid tumors of the gastro-intestinal tract (so-called argentaffin tumors). *Am J Cancer* 18:803-833, 1933.
- Bailey O T. Argentaffinomas of the gastro-intestinal tract: benign and malignant. *Arch Path* 18:843-854, 1934.
- Humphreys E M. Carcinoid tumors of the small intestine: a report of three cases with metastases. *Am J Cancer* 22:765-775, 1934.

MEDICAL PROGRESS

ENDOSCOPY*

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SINCE there have been several recent articles in the *Journal* on gastroscopy (Benedict,¹ Jankelson and McClure²) and peritoneoscopy (Benedict,³ Garrey⁴), this report is confined to a review of the present status and recent progress in bronchoscopy and esophagoscopy, perhaps better termed "bronchoesophagology" (Jackson⁵).

BRONCHOSCOPY

Bronchoscopic examination was originally developed, and during the early years was performed, for the purpose of removing foreign bodies from the tracheobronchial tree. With increased knowledge of pulmonary disease and greater experience in thoracic surgery, however, bronchoscopy has become of major importance in the diagnosis and treatment of intrapulmonary disease. Ap-

proximately only 2 per cent of the bronchoscopies now performed are for the removal of foreign bodies.

Technic

The *sine qua non* of successful bronchoscopy is good teamwork, for with it bronchoscopy is comparatively easy; without it the procedure may be extremely difficult or impossible. When bronchoscopy is made easy, internists and surgeons will request it with almost as little thought as ordering an x-ray examination, and will refer to it as "slipping down a bronchoscope"; when clumsily performed, however, it will seldom be requested a second time, for physicians will not "put their patients through it." Good teamwork means not only a skillful operator but also an experienced head holder and a well-trained nurse in charge of the instruments. Changes in personnel are

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disastrous. Bronchoscopic equipment is delicate and requires constant supervision by experts, for defective apparatus cannot be corrected after the bronchoscope has been introduced. In adults, a preliminary sedation is used with cocainization of the throat; in children, no anesthesia is used. New instruments have been repeatedly designed for special uses by the Jacksons⁶ and others, but in general the technic and equipment are well standardized. The use of the telescopic bronchoscope (Pinchin and Morlock,⁷ Wolfson and Schloss⁸) has permitted in many cases a clear view into the upper-lobe bronchi. The telescope is passed through the standard bronchoscope, and since its objective lens permits vision at right angles to the axis of the instrument, a view can be obtained into an otherwise inaccessible bronchus. If a lesion is visible, the curved flexible forceps may then be passed to obtain a specimen of tissue.

Anatomy

The nomenclature of the various bronchopulmonary divisions and segments has become of great importance to the bronchoscopist and thoracic surgeon, especially since Churchill's⁹ pioneer work on segmental lobectomy. Recent studies have been reported by Neil, Gilmour and Gwynne.¹⁰ Further attempts to standardize the nomenclature are in progress at the Massachusetts General Hospital (Adams and Davenport¹¹). Davis¹² has discussed anatomic variations of the normal tracheobronchial tree.

Use in Various Diseases

Bronchiectasis. The diagnosis of bronchiectasis is usually established by the clinical history and x-ray examination after the instillation of iodized oil. Bronchoscopy is indicated when the question of foreign body arises. Hemoptysis, although a frequent symptom in uncomplicated bronchiectasis, may indicate the presence of a benign or malignant tumor partially blocking the bronchus. Although some evidence of tumor is usually present by physical signs or x-ray examination, bronchoscopy is indicated in doubtful cases. At the conclusion of the procedure, a catheter may be placed in the trachea and iodized oil instilled. This method of bronchography has proved more satisfactory than direct instillation through the bronchoscope. Once a diagnosis of bronchiectasis has been established, the treatment, if possible, is lobectomy. When, however, the disease is too extensive or the patient is a poor operative risk, palliative treatment is given by repeated bronchoscopic aspiration. By this method the patient is relieved of large amounts of foul, partially stagnant secretions, is able to breathe better, raises his secretions

more easily and gains in weight and strength. When large amounts of foul stagnant secretions are present, bronchoscopy is indicated as a preliminary procedure to lobectomy.

Chronic cystic disease. The indications for bronchoscopy in this disease are much the same as in bronchiectasis. In the inoperable cases, striking improvement is seen after bronchoscopic aspirations repeated about every two weeks.

Asthma. Bronchoscopy in asthma has proved of value in diagnosis and treatment. With regard to diagnosis it should be emphasized that although wheeze is a common symptom in asthma, it occurs in other pulmonary diseases, notably carcinoma, benign tumor and foreign body. Clerf¹³ has reported cases with apparent asthmatic wheeze due to carcinoma of the bronchus and foreign body in the esophagus. Whenever any doubt exists, bronchoscopy should be performed. In the treatment of asthma, the procedure has been useful in the aspiration of excessive secretions. Repeated aspiration may be necessary. When atelectasis is present, the bronchoscopic removal of tenacious secretions from the orifice of the involved bronchus may result in re-expansion of the lobe. Bronchostenosis, characterized by febrile episodes, occurred in 68 per cent of the asthma cases recently reported by Prickman and Moersch.¹⁴ In many of these cases, x-ray examination was negative. At bronchoscopy a stenotic bronchus may be visualized and dilated, with aspiration of thick, tenacious secretions. Vaccine made from bronchoscopically removed secretions has been reported to be of value in cases of bacterial allergy.

Chronic bronchitis. Many patients come to the physician because of hemoptysis without other symptoms. In some of these patients, physical examination and complete x-ray study are negative. Bronchoscopy reveals a slightly red, sometimes edematous, friable, easily bleeding mucosa in one or more parts of the tracheobronchial tree. When this mucosa is touched gently with the tip of the bronchoscope, abnormally free oozing of blood occurs. Such a finding accounts for repeated small hemoptyses in these patients. The cauterization of such areas with 5 per cent silver nitrate is apparently of some benefit. Although this disease is not chronic bronchitis in the ordinary sense of the term, it probably represents a mild inflammatory state of the bronchial mucosa.

Acute laryngotracheobronchitis (Richards¹⁵) is a very serious respiratory disease of children and carries a high mortality. It is characterized by edema, desquamation, and the formation of sticky gelatinous crusts, which cause bronchial obstruction with atelectasis. Tracheotomy may be neces-

sary for laryngeal obstruction, and repeated bronchoscopies are required for the removal of obstructive material.

Diffuse polypoid laryngotracheobronchitis (Samson²⁴) is a rare condition characterized by inflammatory polypoid mucosal changes possibly secondary to chronic pulmonary suppuration. Special bronchoscopic curettes have been designed by Samson for rapid removal of the obstructing tissue.

Broncholithiasis, the formation of one or more calcareous deposits in the bronchial tree, is a rare condition and is probably the result of inflammation in the bronchus or erosion of a calcareous peribronchial lymph node. Cough, hemoptysis, wheeze and signs of bronchial obstruction may be present. Bronchoscopy is indicated for accurate diagnosis and removal of the broncholith.

Postoperative pulmonary complications. Postoperative atelectasis frequently clears up spontaneously after severe coughing and changes in the patient's position. When, however, re-expansion does not take place promptly, bronchoscopy is indicated to remove thick tenacious secretions plugging the bronchial orifice. By securing prompt re-expansion of the lobe under such conditions, one may prevent more serious pulmonary complications. Gius²⁷ has recently reviewed this subject in detail, stating that bronchoscopic aspiration has been repeatedly used with gratifying results. Anesthesiologists (Beecher,²⁸ Mousel,²⁹ Eversole³⁰) are becoming increasingly aware of the value of tracheobronchial aspiration during and after anesthesia.

Lung abscess. Bronchoscopy is indicated in lung abscess to exclude or remove foreign bodies, to localize exactly the abscess in a particular pulmonary segment, to aspirate secretions and to improve drainage from the abscess cavity. Bronchoscopy sometimes discloses an unsuspected neoplasm in addition to the abscess. Bronchoscopic treatment of lung abscess should be reserved primarily for abscesses that are accessible to the major bronchi. Appropriate medical measures must also be instituted, including rest in bed, adequate diet and postural drainage. If an early response to medical and bronchoscopic treatment is not obtained, surgery is indicated. The management of lung abscess should therefore be in the hands of the internist, roentgenologist, bronchoscopist and thoracic surgeon.

Malignant tumor. The frequency of primary carcinoma of the lung is apparently increasing. A presumptive diagnosis may often be made from the history of cough, hemoptysis and weight loss, together with the physical signs and x-ray find-

ings. A positive diagnosis can be made in about 75 per cent of the cases by bronchoscopic biopsy, and the exact location of the tumor is established. Only by knowing as closely as possible the exact site of the lesion can the proper procedure—lobectomy, pneumonectomy or x-ray therapy—be determined. Removal of large amounts of cancer tissue by bronchoscopy may occasionally be of temporary benefit in improving the airway. The introduction of radon seeds through the bronchoscope is of little value compared to x-ray treatment. If lobectomy or pneumonectomy is not indicated, marked relief of cough, pain and hemoptysis is sometimes obtained by x-ray therapy, particularly in the oat-cell or highly malignant cancers. When life is prolonged over two years by any type of nonsurgical therapy in carcinoma, one must seriously question the diagnosis, for benign adenoma may simulate adenocarcinoma. Metastatic tumors to the lung seldom invade the major bronchi. When they do on rare occasions obstruct a major bronchus, improvement in the airway may be obtained by bronchoscopic removal and x-ray therapy. In the present state of knowledge, the only hope of cure in cancer lies in early diagnosis. For this reason, it is important to perform bronchoscopy early when bronchogenic carcinoma is suspected.

Benign tumor. Adenoma is undoubtedly the commonest benign tumor of the bronchus. Although the history of long-continued hemoptysis in a young patient, in addition to the physical signs and x-ray findings, may lead to a probable diagnosis of adenoma, atypical cases occur frequently enough to make a positive diagnosis possible only by bronchoscopy. When the bronchoscopist sees a smooth rounded tumor mass in the bronchus, he may be reasonably sure that he is dealing with a benign tumor, but sometimes a fairly smooth fingerlike process from a carcinoma may project upward into the bronchus and may be confused with a benign tumor. Bronchoscopic biopsy leads to a positive microscopic diagnosis. If the case is one of benign tumor and irreparable lung damage has not already occurred as a result of bronchial obstruction, bronchoscopic removal of the tumor is indicated. This may require several bronchoscopies, and the site of the tumor should be inspected subsequently at regular intervals to detect possible recurrence. Although a considerable portion of the tumor may lie outside the bronchus, it is nonmalignant, and the patient is entirely relieved by bronchoscopic removal. If irreparable lung damage has occurred and the patient's symptoms and general condition warrant it, lobectomy or pneumonectomy is indicated.

Tuberculosis. Tracheobronchial tuberculosis is encountered with increasing frequency and is therefore of great importance. Its apparent increase is probably due largely to the more frequent use of the bronchoscope. It occurs in approximately 10 per cent of the cases of pulmonary tuberculosis. The old fear that bronchoscopy might cause a spread of the lesion has not been borne out by hundreds of bronchoscopic examinations in various stages of the disease. A persistently positive sputum in the face of essentially negative or minimal x-ray findings may be explained by the bronchoscopic demonstration of ulcerative or proliferative bronchial lesions. Such lesions may heal after the application of silver nitrate, but the fact that they have also been observed to heal spontaneously with probable equal frequency gives little encouragement to the use of intrabronchial applications. Unfortunately these lesions usually do not heal but tend to increase in size, to appear in other locations and to produce bronchial obstruction. In selected cases during the acute congestive stage, x-ray treatment is of benefit (Davenport²¹). Fibrous stenosis from old tracheobronchial tuberculosis may cause symptoms of intermittent bronchial obstruction, namely, cough, fever and malaise, with inability to raise sputum. In such cases, gentle dilatation of the stenosis by soft bougies may relieve the obstruction and cause marked improvement. Bronchiectasis may develop distal to the stenosis. In general, the prognosis of active tracheobronchial tuberculosis is bad. Occasionally tuberculous lymph nodes may by extrinsic pressure on the trachea or bronchi cause partial obstruction. Such lymph nodes may erode the bronchial mucosa, enter the bronchus and cause complete obstruction; they should be removed bronchoscopically.

The following are the indications for bronchoscopy in tuberculosis: obstructive symptoms, that is, atelectasis, wheeze, difficulty in raising sputum, persistent cough or dyspnea out of proportion to the amount of pulmonary disease, periodic intermittent febrile attacks and x-ray evidence of bronchial narrowing; positive sputum when parenchymal disease is controlled or absent; hemorrhage in the absence of sufficient pulmonary disease to explain the source; proposed collapse therapy in those in whom there is any question of tracheal stenosis or stenosis of the contralateral bronchi.

Sarcoid. Pulmonary sarcoidosis is not uncommon. Bronchial involvement by sarcoid was first reported, however, in a recent paper by Benedict and Castleman.²² In this case, the signs and symptoms of bronchial obstruction were the important

features. Bronchoscopy showed extensive intrinsic involvement of the bronchial mucosa. A bronchoscopic biopsy showed the characteristic histology of sarcoid without evidence of tuberculosis. Treatment through the bronchoscope resulted in marked improvement.

Foreign body. Although representing only a small proportion of the work in any bronchoscopic clinic, the removal of foreign bodies is still probably the most dramatic work of the bronchoscopist. Since instruments exist for the removal of all sizes and shapes of vegetal and metallic foreign bodies in children as well as in adults,—not only from the major lower-lobe bronchi but also, with the aid of the biplane fluoroscope and the costophrenic bronchoscope, from the upper lobe and terminal bronchi,—it is evident that few foreign bodies are beyond bronchoscopic removal. Although all foreign bodies should be promptly removed, some metallic foreign bodies have been known to remain in the bronchi for a number of years and, in the absence of bronchial obstruction, to have caused comparatively little lung damage. Since all vegetal substances cause violent mucosal reactions, frequently with complete bronchial or even tracheal obstruction, their removal constitutes a real emergency. A bronchoscopic clinic should, therefore, be in a state of complete preparedness for any emergency.

ESOPHAGOSCOPY

Technic

The same considerations apply here as were emphasized in the paragraph on bronchoscopic technic. Particularly important is the avoidance of general anesthesia, which is not only unnecessary and more dangerous than local anesthesia but also likely to limit the frequency with which the procedure will be requested.

Use in Various Diseases

Carcinoma. This is by far the most important disease of the esophagus. The first symptom is difficulty in swallowing solid food. Regurgitation of food, saliva and blood is common. Difficulty in swallowing liquids is a late symptom. Pain, if present at all, is usually noted only in the late stages. For an early diagnosis of carcinoma of the esophagus, every patient complaining of dysphagia should have immediate x-ray examination. The x-ray diagnosis of esophageal carcinoma is highly accurate, but confusion has sometimes occurred with benign stricture and with cardiospasm. Esophagoscopy is indicated in every case of suspected cancer of the esophagus. A biopsy can be obtained and the diagnosis thus positively estab-

lished, with grading of the type and degree of malignancy. Moreover, the esophagoscopist may be able to give useful information to the thoracic surgeon regarding possible fixation of the growth. Because of recent advances in the technic of esophagectomy, it is imperative that the diagnosis be established early. I have recently seen two comparatively young patients (forty-two and fifty-seven years of age) in whom the history and x-ray findings were those of carcinoma, but in whom esophagoscopy at another hospital failed to reveal the tumor. These patients were treated for benign stricture until a subsequent esophagoscopy demonstrated carcinoma, when it was too late to operate. Under such circumstances the important thing is to perform repeated esophagoscopies until no doubt remains as to the correct diagnosis.

Many patients, unfortunately, are seen so late in the disease or are such poor surgical risks that operation is not indicated. Much can be done, however, to keep these patients comfortable. The lumen of the esophagus can be kept open by bouginage and x-ray treatment, and since everyone prefers feeding by mouth to being fed by gastrostomy tube, this is very important and saves many needless gastrostomies. Whenever during the course of the disease or as a temporary result of x-ray treatment the lumen of the esophagus becomes so narrowed that only liquids are tolerated, the patient should be instructed to swallow a thread over which bougies may be passed. After about 15 feet of thread has been swallowed, it becomes securely anchored and serves as a guide for the passage of bougies. There is, of course, some danger in stretching an esophagus invaded by cancer, but the risk is worth taking under these circumstances, and in my experience there have been no accidents. I have under my care a young patient with carcinoma of the esophagus (recognized too late for esophagectomy) who could barely swallow liquids on admission but who now can eat normally as a result of bouginage and x-ray treatment. Although he will ultimately succumb to the disease, he is leading a fairly normal life and has returned to work. Such palliative results are definitely worth while.

Benign tumors of the esophagus are exceedingly rare. Patterson,²³ in 1932, was able to find reports of only 61 cases in the literature. Among these are included adenomas, fibromas, lipomas, angiomas, papillomas, leiomyomas and myxomas. The symptoms are usually dysphagia and regurgitation. X-ray examination should show the location of the tumor. Esophagoscopy is necessary for biopsy and removal.

Cardiospasm. This diagnosis is usually made

by history and x-ray examination, but in doubtful cases esophagoscopy is occasionally indicated to rule out carcinoma. Although drug therapy and psychotherapy are sometimes of benefit, the most striking improvement usually follows dilatation with mercury bougies. This may have to be repeated at varying intervals. Occasionally in intractable cases the use of the Plummer bag is advisable. Rarely, as in some cases of long-standing cardiospasm with megaesophagus, some type of plastic surgery of the cardia is indicated.

Benign stricture. Stricture of the esophagus may be congenital, the result of lye burn or the result of an inflammatory process. Diagnosis and treatment by esophagoscopy and bouginage are indicated. In any event, carcinoma must be ruled out, since it occasionally develops at the site of congenital or lye stricture (Benedict²⁴).

Esophagitis. Some physicians seem surprised when a diagnosis of esophagitis is proposed, but when one looks at the esophageal mucosa through the esophagoscope and finds it red and edematous, sometimes with exudate and mucosal proliferation, there can be no doubt of the existence of an inflammatory process. Such a diagnosis is suggested by substernal pain aggravated by swallowing. Hematemesis is not uncommon. The diagnosis is made only by esophagoscopy. Sometimes the process is so proliferative as to be confused with carcinoma; in such cases, a biopsy will establish the diagnosis, and suitable treatment can be instituted.

Peptic ulcer. Benign ulcers of the esophagus are rare. They occur at the lower end, and cause symptoms similar to gastric or duodenal ulcer. Unless there is a congenitally short esophagus or aberrant gastric mucosa, the term "peptic" is a misnomer. Esophageal ulcer may occur in association with gastric or duodenal ulcers, or with esophagitis, and the process may go on to stenosis (Jackson,²⁵ Benedict and Daland,²⁶ Klein and Hochbaum²⁷). Esophagoscopy is indicated for diagnosis and treatment.

Foreign body in the esophagus is usually recognized by the history and x-ray examination. Unless the foreign body passes quickly into the stomach, esophagoscopy is indicated to remove it. Because of the danger of perforation, blind bouginage for the purpose of forcing the foreign body into the stomach is to be severely condemned. Pushing the foreign body into the stomach at esophagoscopy is also to be deplored, for it is very rare indeed that a foreign body in the esophagus cannot be safely removed through the mouth. Most foreign bodies that have reached the stomach go through the pylorus and proceed through the intestinal tract

without undue delay. Sometimes, however, large objects fail to pass the pylorus, and certain long and sharp objects may encounter difficulty in following the turns of the intestine. Such foreign bodies may be removed by open-tube gastroscopy or by the use of Tucker's²⁸ sheathed flexible gastroscopic forceps under biplane fluoroscopic guidance. If perforation of the esophagus occurs either as a result of the character of the foreign body or as a result of instrumentation, radical surgical drainage is indicated to prevent mediastinal abscess.

Varices. Esophageal varices are now commonly recognized by x-ray examination (Schatzki²⁹). Since fatal hemorrhage is a frequent occurrence in patients with extensive varices, and since no surgical approach has been successful, injection of sclerosing solutions into the veins through the esophagoscope has been performed by Crafoord and Frenckner³⁰ and by Walters, Moersch and McKinnon.³¹ I have recently treated a patient in this manner.

REFERENCES

1. Benedict, E. B. Examination of the stomach by means of a flexible gastroscope: a preliminary report. *New Eng. J. Med.* 210:669-674, 1934. Chronic gastritis a clinical discussion based on gastroscopic examination. *Ibid* 212:468-472, 1935. Gastroscopic observations in neoplasm. *Ibid* 214:563-566, 1936. Gastroscopic examination. *Ibid* 222:427-434, 1940. Indications for gastroscopy. *Ibid* 223:925-933, 1940.
2. Jankelson, I. R. and McClure, C. W. Some observations on the clinical status of gastroscopy. *New Eng. J. Med.* 219:917-920, 1938. Limitations of gastroscopy. *Ibid* 224:64-67, 1941.
3. Benedict, E. B. Peritoneoscopy. *New Eng. J. Med* 218:713-719, 1938.
4. Garrey, W. E. An evaluation of peritoneoscopy. *New Eng. J. Med.* (in press).
5. Jackson, C. Broncho-esophagology postulated semasiologic observations. *Ann. Otol., Rhin. & Laryng.* 47:1049-1053, 1939.
6. Jackson, C. and Jackson, C. L. *Bronchoscopy, Esophagoscopy and Gastroscopy*. Third edition. 485 pp. Philadelphia: W. B. Saunders & Co., 1934.

7. Pinchin, A. J. S. and Morlock, H. V. Bronchoscopic apparatus. *Lancet* 1:671, 1932.
8. Wolfson, L. E. and Schloss, J. A telescopic bronchoscope. *Ann. Otol., Rhin. & Laryng.* 44:889-892, 1935.
9. Churchill, E. D. and Besley, R. Segmental pneumonectomy in bronchiectasis the lingula segment of the left upper lobe. *Ann. Surg.* 109:481-499, 1939.
10. Neil, J. H., Gilmour, W. and Gwynne, F. J. The anatomy of the bronchial tree. *Brit. M. J.* 1:495-498, 1939.
11. Adams, R. and Davenport, L. F. unpublished data.
12. Davis, J. D. Anatomic variations of the normal tracheobronchial tree. *Arch. Otolaryng.* 9:404-413, 1929.
13. Clerf, L. H. The present status of bronchoscopy in bronchial asthma. *Ann. Int. Med.* 9:1050-1056, 1936.
14. Prickman, L. E. and Moersch, H. J. Bronchostenosis complicating allergic and infectious asthma. *Ann. Int. Med.* 14:387-392, 1940.
15. Richards, L. A further study of the pathology of acute laryngo-tracheobronchitis in children. *Ann. Otol., Rhin. & Laryng.* 47:316-341, 1938.
16. Samson, P. C. Diffuse polypoid laryngotracheobronchitis. *J. Thoracic Surg.* 9:679-688, 1940.
17. Guss, J. A. Postoperative atelectasis and related pulmonary complications. *Internat. Abstr. Surg.* 71:65-78, 1940.
18. Beecher, H. K. II. Some controversial matters of anesthesia for thoracic surgery. *J. Thoracic Surg.* 10:202-219, 1940. Principles of anesthesia for lobectomy and total pneumonectomy. *Acta med. Scandinav.* Supp. 90:146-161, 1938.
19. Mousel, L. H. Bronchoscopic treatment of postoperative atelectasis. *Proc. Staff Meet., Mayo Clin.* 15:261-264, 1940.
20. Eversole, U. H. and Lahey, F. H. Aspiration of the respiratory passages as an aid in the prevention and treatment of postoperative pulmonary complications. *Lahey Clin. Bull.* 2:2-6, 1940.
21. Davenport, L. F. Tuberculous tracheobronchitis: radiation therapy. *Am. J. Roentgenol.* (in press).
22. Benedict, E. B. and Castleman, B. Sarcoidosis with bronchial involvement: report of a case with bronchoscopic and pathological observations. *New Eng. J. Med.* 224:186-189, 1941.
23. Patterson, E. J. Benign neoplasms of the esophagus: report of a case of myxofibroma. *Ann. Otol., Rhin. & Laryng.* 41:942-950, 1931.
24. Benedict, E. B. Carcinoma of the esophagus developing in benign stricture. *New Eng. J. Med.* 224:408-412, 1941.
25. Jackson, C. L. Esophageal stenosis associated with ulcer of the stomach and duodenum. *Tr. Am. Therap. Soc.* 32:143-148, 1932.
26. Benedict, E. B. and Daland, E. M. Benign stricture of the esophagus complicating duodenal ulcer. *New Eng. J. Med.* 218:599-601, 1938.
27. Klein, I. and Hochbaum, W. Stenosing esophagitis associated with duodenal ulcer. *Am. J. Roentgenol.* 42:724, 1939.
28. Tucker, G. A new method of removal of foreign bodies from stomach with the author's sheathed flexible gastroscopic forceps. *J. A. M. A.* 105:1596, 1935.
29. Schatzki, R. Roentgen demonstration of esophageal varices its clinical importance. *Arch. Surg.* 41:1084-1100, 1940.
30. Crafoord, C. and Frenckner, P. New surgical treatment of varicose veins of the esophagus. *Acta oto-laryng.* 27:422-429, 1939.
31. Walters, W., Moersch, H. J. and McKinnon, D. A. Bleeding esophageal varices: an evaluation of methods directed toward their control, especially by direct injection of a sclerosing solution. *Arch. Surg.* 41:1101-1117, 1940.

CASE RECORDS OF THE
MASSACHUSETTS GENERAL HOSPITALANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27141

PRESENTATION OF CASE

First Admission. A fifty-one-year-old woman entered the hospital complaining of abdominal pain.

The patient had a story of generalized abdominal pain localizing in the right lower quadrant, anorexia, constipation and vomiting of two days' duration. The abdomen was tympanitic and quiet, with spasm and marked tenderness in the right lower quadrant; the white-cell count was 11,700, the temperature 100°F. A diagnosis of acute appendicitis was made, and at operation about 100 cc. of thin fecal pus was found in the peritoneal cavity, together with two free-lying fecaliths, the whole contained in a cavity whose lower medial wall was composed of small bowel bound together by thin inflammatory film. The appendix was retrocecal and had a large perforation near its base that had almost transected it. It was resected, and a chromic tie placed about the base; the wound was closed around two cigarette wicks. Postoperatively the patient was given sulfapyridine and two 500-cc. blood transfusions. Purulent material drained from the wound for nine days, and she ran a temperature until the nineteenth postoperative day, generally spiking to 101°F., but occasionally to 102. The white-cell count was 14,000 on the twelfth day, but rapidly became normal. The patient was discharged twenty-four days after admission.

Final Admission (five months later). One month after discharge the patient came to the Out Patient Department for a routine follow-up with the single complaint of gas pains two days previously; physical examination was negative. She was well until six days before admission, when a non-radiating epigastric soreness developed, accompanied by anorexia and nausea. This dull pain soon became generalized and finally localized in the hypogastrium, at which time she suffered from urinary incontinence and burning. The pain continued for two days and was associated with constipation; she took castor oil, which resulted in several bowel movements and great relief. At the time of observation, pain had been absent for two days, although anorexia had persisted. The tem-

perature was found to be 103°F., so that immediate admission was advised.

On examination the patient was well developed and well nourished and in no acute distress. Examination of the heart and lungs was negative; the blood pressure was 115 systolic, 80 diastolic. The abdomen was not tender, and peristalsis was very active. There was slight right costovertebral tenderness. On pelvic and rectal examinations one examiner felt an ill-defined, irregular mass in the right vault.

The temperature was 103°F., the pulse 100, and the respirations 30.

The urine was normal. The blood showed a red-cell count of 4,000,000 with a hemoglobin of 75 per cent, and a white-cell count of 19,900 with 87 per cent polymorphonuclears. The nonprotein nitrogen of the blood serum was 19 mg., the protein 6.7 gm. per 100 cc., the serum van den Bergh slightly above normal (biphasic) and the chlorides 955 milliequiv. per liter. Agglutination reactions for typhoid and paratyphoid bacilli and *Brucella abortus* were negative.

A flat abdominal x-ray film showed no dilated loops. There was a moderate amount of gas in the right half of the colon, and a small quantity of gas in the small bowel. A Graham test showed a segment of bowel, apparently the small intestine, unusually high and in front of the liver. A faint shadow of the gall bladder was seen within the shadow of the liver, with a round area of decreased density near the fundus consistent with a cholesterol stone. An x-ray film of the chest showed the diaphragm to be high on both sides, motion being slightly less on the right. The lung fields were clear, and the heart was transverse in position, but not definitely enlarged.

On the third hospital day there were diminished resonance and fremitus at the right lung base, with no rales, but many loud rhonchi and a definite friction rub over the area; the right diaphragm moved fairly well. Slight spasm was present in the right upper quadrant of the abdomen, the liver was 1 cm. below the costal margin and there was right costovertebral tenderness. Five days later the patient was much worse, her eyes were sunken, and she was sweating profusely but complained only of an occasional pleuritic pain in the right posterior chest. The abdomen was tender below the costal margin in the anterior axillary line, and there was some muscle resistance there, but no true spasm. She began to suffer from chills, and the scleras became slightly icteric; pain was referred to the right scapular region. The next day there was tenderness on percussion over the right costal margin; the right diaphragm was

higher than the left and moved hardly at all; coarse rales were present at both lung bases, more pronounced on the right. The white-cell count was 34,000, the hemoglobin 60 per cent.

An operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. HENRY H. FAXON: Perhaps we had best start by looking at the x-ray films.

DR. AUBREY O. HAMPTON: This plain film of the abdomen shows gas in the right colon.

DR. FAXON: Is it necessarily in the colon?

DR. HAMPTON: Yes. That is the cecum, and this, the hepatic flexure; there is not much gas in the small bowel. However, I do not believe there is enough gas anywhere to be of much significance. It does not indicate obstruction, so far as I can tell. The gall bladder did not concentrate the Graham dye normally, but just enough to show a large nonopaque stone.

DR. FAXON: In the record it says, "A Graham test showed a segment of bowel, apparently the small intestine, unusually high and in front of the liver."

DR. HAMPTON: I do not get that impression. These bubbles could be in the colon. I do not consider the condition abnormal.

DR. FAXON: And the shadow that you see there is almost certainly a gallstone?

DR. HAMPTON: Yes. It maintains its relation with a faint shadow of the gall bladder. I think we can be fairly certain that there is a stone.

DR. FAXON: When I first read the report, I considered the possibility whether the shadow described in the region of the liver could be an abscess cavity in the liver rather than a gall bladder with stone.

DR. HAMPTON: I do not believe that it could.

DR. FAXON: We have a fifty-one-year-old woman with the classic signs of acute infection, which we can readily localize within certain limits. In cases in which a liver abscess or a subphrenic abscess is suspected, the differential diagnosis is often further confused by the presence of chest signs or symptoms that make it difficult to decide whether the process is above or below the diaphragm. In this case, from the past history, from the earlier x-ray studies and from the chest examination, we can safely conclude that the infectious process is not in the chest itself. The diaphragm was limited and high, and the patient had some pleuritic pain, but these findings could certainly be accounted for by irritation below the diaphragm.

Is there anything to suggest that the infectious process might be in the kidney? We have the finding of costovertebral tenderness on one occa-

sion, and also a note of burning and frequency of urination. I think it is worth pointing out that one should not jump to the conclusion that costovertebral tenderness is of necessity due to disease of the kidney. With a subphrenic abscess one of the most typical findings is tenderness in that region, more especially brought out by pressure over the twelfth rib than by pressure in the angle itself. Inasmuch as later in the story the urine was negative and the nonprotein nitrogen normal, it seems to me that we can rule out the kidney as the site of this infection.

What part might the intestinal tract have played in the symptomatology? The crampy pain, the hyperactive peristalsis on examination and the relief from discomfort with bowel movements all suggest the possibility of obstruction. However, obstruction would not account for the high temperature and persistently high white-cell count. I think it is more than possible that in the walling off of the original inflammatory process the patient may have developed adhesions between loops of small intestine that gave rise to a certain degree of subacute obstruction accounting for the early symptoms one month after her discharge from the hospital; these adhesions may have been a contributing but relatively unimportant factor when she came in at this admission.

That brings us to the gall bladder. We have the story of right-upper-quadrant pain, with radiation to the right posterior chest. We have jaundice as the disease progressed, and furthermore we have the perfectly definite finding by Graham test of a stone in the gall bladder. Can the whole picture be accounted for on the basis of cholecystitis and cholelithiasis? It seems to me that with such a high white-cell count and temperature, there would have been more striking physical signs in the gall-bladder region if the pathologic process had been confined to that area. One of the early signs was tenderness in the costovertebral region rather than in the anterior part of the abdomen, and as the story progresses the tenderness and spasm were almost always well lateral and posterior rather than in the region of the gall bladder itself. I do not believe, therefore, although the patient had a definite stone, that cholecystitis and cholelithiasis were the main factors in this case.

With the antecedent story of ruptured appendix, we come down to a differential diagnosis between subphrenic abscess and liver abscess secondary to pylephlebitis. It may seem to be of somewhat academic interest to try to make a distinction between these two conditions, but as a matter of fact it is of extreme practical importance to the surgeon if he is going to drain the area to know which of the two situations exists. In favor of

liver abscess we have as the most significant thing about the first entry with its operation for her ruptured appendix the fact that the temperature, instead of returning to normal, persisted around 101 and 102°F. for a period of over two weeks. Before operation on the second admission, the patient had chills and jaundice; the diaphragm, which was elevated but not fixed at first, later became almost fixed, and the liver was said to be enlarged. It might be of interest to pause a moment and consider the incidence of chills in relation to pyelphlebitis in association with appendicitis. Of the cases of ruptured appendices in this hospital, approximately 10 per cent gave a history of chills prior to operation. Only 10 per cent of these, however, went on to develop pyelphlebitis. On the other hand, of the patients who are known to have had pyelphlebitis, almost all at some time in the course of the disease complained of chills. The incidence of pyelphlebitis and liver abscess with acute appendicitis is approximately 0.5 per cent. So much for the possibility of liver abscess.

What evidence have we to endorse a subphrenic abscess as the cause of this patient's symptoms? Again we have the history of ruptured appendix, on the first admission, with thin pus and two fecaliths free in the peritoneal cavity. The thin pus could have been aspirated into the subdiaphragmatic region, since the pressure in the upper abdomen with quiet respirations is less than that in the lower portion. If there were two fecaliths, there might have been a third that could have served as a focus for persistent infection and possible abscess formation. The incidence of subphrenic abscess with acute appendicitis is about twice that of pyelphlebitis. The high diaphragm, which is a finding that is almost always present with a subphrenic abscess, is present in about half the cases of liver abscess. However, the motion of the diaphragm is far more apt to be restricted or absent with a subphrenic abscess than with a liver abscess. The objection might be raised in considering these two diagnoses that, because of the long interval between the inciting appendectomy with drainage and the subsequent development of the condition that the patient showed, they could be excluded. It was of interest to me in reviewing the cases of subphrenic abscess in this hospital since 1900, however, to find that almost 10 per cent of the patients gave a story of over three months from the time of the inciting cause to the time of the drainage of the abscess. It is only fair to say that many of the long delayed cases were in the early years of that period and far fewer in the later years.

From the history as given here, I should think that we must explain in some way the change in the picture from apparent health to illness that occurred six days prior to entry. Had it been a subphrenic abscess from the start, I do not believe there would have been so abrupt and sudden an onset six days before the patient came in the second time. The only way that I can rationalize that short story on the basis of either a liver or subphrenic abscess is to assume that the collection of pus that had developed secondary to the first operation ruptured or leaked six days prior to the time that she came in. The fact that there were so few signs in the chest at the time of entry is against a long-standing subphrenic abscess. This is not inconsistent with long-standing liver abscess, and I believe that what happened in this case was that the patient had a gangrenous appendix, developing a subclinical pyelphlebitis with a residual liver abscess, and that the abscess had smoldered along for five months and finally came to the surface of the liver, either to leak or to cause further irritation in one of the subphrenic spaces.

My diagnosis is liver abscess, with secondary subphrenic abscess and the incidental findings of cholelithiasis and pleuritis.

DR. OLIVER COPE: This patient's second admission came when I was on service. The history is a bit misleading, although it is the history that she gave. She was a very uncomplaining woman, and it was only on further questioning after the preliminary studies had been made that we found out what had happened before the onset of the immediate symptoms bringing her to the hospital. It was obvious that she had never been well from the time of the first admission and that her difficulties were due to a complication after appendicitis, even though it was five months from the time of the ruptured appendix. We argued, like Dr. Faxon, that it must be either liver abscess or subphrenic abscess. There were not sufficient signs immediately, but when the temperature began spiking and the van den Bergh became positive (the jaundice was not really noticeable clinically), we suspected that it was a liver abscess. Dr. Howard Ulfelder operated on the patient, and I scrubbed up with him. He made a diagnosis of liver abscess. I was not sure it was not subphrenic abscess in view of the positive signs that she showed. It turned out that it was quite a large liver abscess. Dr. Ulfelder resected the twelfth rib on the right side and then inserted a needle in two or three places. Finally pus was found. There was nearly a centimeter of uninvoluted liver protecting the subphrenic space, but in spite of that there was considerable edema and inflamma-

tion on the undersurface of the diaphragm, so that there was really an incipient subdiaphragmatic abscess. This inflammation accounted for the chest signs. We suspected that there might be other abscesses, even though the abscess cavity was at least 10 cm. in diameter.

The postoperative course was stormy. The infection was progressively severe and overwhelming; the patient died in spite of chemotherapy nine days after drainage of the abscess. The chart is interesting. During the week she was in the hospital before operation the temperature climbed to 103°F. After the operation the temperature dropped to normal for several days, but clinically the patient did not improve so much as the drop in temperature indicated. The pulse was 100 to 120, and there was a terminal abrupt rise. We suspected that we had drained only one of several abscesses within the liver.

CLINICAL DIAGNOSES

Liver abscess.

Subdiaphragmatic abscess.

DR. FAXON'S DIAGNOSES

Liver abscess, with secondary subdiaphragmatic abscess.

Cholelithiasis.

Pleuritis.

ANATOMICAL DIAGNOSES

Multiple abscesses of the liver.

Peritonitis, acute fibrinopurulent.

Icterus.

Cholelithiasis.

Leiomyoma of uterus.

Surgical wounds: appendectomy; drainage of liver abscess.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: The autopsy showed numerous other abscesses. There were two large ones and a very considerable number of abscesses 0.5 to 1 cm. in size. It would obviously have been impossible to drain the major proportion of them. The autopsy was limited to the abdomen, so that I cannot say whether there was a pleuritis or not. The portal vein was dissected with care, and no evidence of thrombosis could be made out. A rather unexpected finding at autopsy was a severe general peritonitis. This was evidently of some duration, since most of the pus was in well-isolated pockets and there was very little fluid free in the peritoneal cavity. Some of the localized pockets were of considerable size, including one 6 cm. in diameter just lateral to the cecum. At what time peritonitis developed I do not believe we can say—presumably very close to the time the abscess

was drained but whether before or after I do not know.

DR. COPE: The general peritonitis was a surprise to us. We did not clinically appreciate it. Whether it had any relation to the obstipation and the catharsis that the patient had had before coming in we do not know. Another possible source of the peritonitis is that, since we obviously opened into a clear fascial plane above and behind the liver, we opened new pathways to infection that had not existed at the time of the ruptured appendix. Do Dr. Mallory and Dr. Faxon agree that we were right in assuming that the liver abscesses were the result of portal-vein infection?

DR. MALLORY: I think there is very little doubt that that must have been the pathway of infection. It was presumably a matter of metastasis of a few organisms rather than an ascending thrombophlebitis.

To conclude: a gallstone was present. We found no organic obstruction of the bowel. The only other finding was a moderately large fibroid of the uterus, which was evidently the mass that one examiner found on pelvic examination.

DR. FAXON: May I ask Dr. Hampton if there is any way of showing a cavity of that size in the liver by x-ray?

DR. HAMPTON: Yes, when it is filled with gas or when Thorotrast is given.

CASE 27142

PRESENTATION OF CASE

First Admission. A fifty-five-year-old Swedish-American shovel polisher entered the hospital for study.

While working one hot day nine months before admission, the patient felt drowsy and stated that he was unable to sweat; several of his colleagues were similarly affected. Since that time he had been troubled with a nocturia of twice a night, and for the next two months his skin was dry and never perspired. Two months before entry, a pleuritic pain developed over the third and fourth ribs in the right anterior axillary line, accompanied by a slight cough with a small amount of white sputum. The following day his physician recorded an elevated temperature and a pulse of 100, with a few rales at the right apex. Strapping the chest eased the pain, which disappeared in three or four days. A few days later, the patient caught cold, and again there was cough with slight sputum, but no pain; these symptoms continued for a month, and he was weak and slightly dyspneic on exertion and was forced to give up working. Three weeks before admission his physician noted occasional rales and wheezing in both lungs.

The sputum was said to have been negative for tubercle bacilli, and an x-ray film of the chest showed clear apices and no pleural fluid, but a soft shadow and small calcified nodules in both lung roots. There was no gross consolidation or cavitation. Four days prior to entry a "sore spot" developed below the left costal margin, and pressure over this point gave pain in the right shoulder. In a period of half an hour the soreness gradually shifted across the epigastrium to below the right costal margin and from there to the ribs above the costovertebral angle. It was aggravated by deep breathing, when pain was also noticed in the right shoulder. Strapping the chest again gave relief. His physician stated that the patient's skin had grown darker during the previous six months. He had lost 15 pounds in weight.

The patient had had gonorrhea at twenty-eight, and fifteen years before entry "rheumatism" for ten weeks, characterized by pain without swelling, first in the knees, then "all over the body."

On examination the patient was a rather poorly nourished red-haired man with freckled pigmentation of the skin, but not of the mucous membranes. The eyes were prominent, with widened palpebral fissures and lid-lag; the thyroid gland was not enlarged. The nasopharynx was reddened. The chest was somewhat barrel-shaped, and tenderness was present over the lateral edge of the right trapezius muscle in the neck. Percussion posteriorly revealed a 4-cm. excursion of the diaphragm on the left, with none on the right. Posteriorly dullness was present to the ninth rib on the left, and to the seventh rib rising into the axilla on the right; anteriorly the upper border of dullness reached the fourth rib on the right. On auscultation the left lung was clear, but on the right there were diminished breath sounds and vocal resonance over the area of dullness, with a few coarse rales immediately above it. The heart was normal; the blood pressure was 135 systolic, 95 diastolic. The liver was palpable four finger-breadths below the costal margin in the mid-clavicular line. There was a slight tremor of the hands. Rectal examination was negative.

The temperature was 97°F., the pulse 90, and the respirations 20.

The urine showed a ++++ sugar reaction. Examination of the blood showed a red-cell count of 5,200,000 with a hemoglobin of 99 per cent, and a white-cell count of 8500 with a normal differential. The fasting blood sugar ranged from 138 to 185 mg. per 100 cc. A bromsulphalein test was normal, and a formol-gel test showed minimal gelling in twenty-four hours. The blood Hinton reaction was negative. Examination of the spu-

rum and stools was negative. Determinations of the basal metabolic rate gave readings of +39 and +33 per cent. A biopsy of the skin was normal.

An x-ray film of the chest showed the right diaphragm to be elevated, with only a very small respiratory excursion. There were several plate-like foci of atelectasis, and one of these areas arose from a triangular shadow that lay close to the pleural surface. There was no definite evidence of fluid, and the lung fields were otherwise not remarkable. The size of the heart was at the upper limits of normal, and there was calcification of the aorta. A week later the right diaphragm was normal in position, with normal respiratory motion. No fluid was visible, and the lung field appeared normal.

A flat film of the upper abdomen showed the lower border of the liver to be slightly lower than usual, particularly on the left side. The spleen was not enlarged. There were several areas of calcification in the region of the lower edge of the liver on the right side, as well as an area of calcification behind the stomach on the left. Gallstones were thought to be the most probable explanation for the calcified areas on the right side. There was no evidence of varices in the esophagus.

The patient was iodized, and the diabetes brought under control with insulin. A subtotal thyroidectomy for hyperthyroidism was performed three weeks after admission. He was discharged one week later on a diabetic diet with no insulin.

Second Admission (eight months later). The patient was seen three weeks after discharge and had improved very satisfactorily. His appetite was good, and he had gained in weight and strength. There was no tremor, nervousness, palpitation, excessive thirst or frequency, though a nocturia of once a night was still present. A moderate edema about both eyes was noted, and the right eye was still a bit prominent, without lid-lag. The heart was slow and regular, the blood pressure 140 systolic, 108 diastolic, and the basal metabolism rate -2 per cent. Two months later, the findings were the same, but the urine gave an orange sugar reaction, and the blood sugar was 210 mg. per 100 cc., so that insulin therapy was instituted. Four months before admission, the patient began to suffer from fatigue; his legs felt tired and heavy, with a "numb feeling" at the instep of the right foot. In addition, he noticed transient spells of "wooziness," with a staggering gait lasting but a few seconds. Six weeks before entry, he noticed that his skin was becoming dry and scaly. At the time of admission, he volunteered in a slow, deep, husky voice that he worked and thought more slowly than before, and complained of constipation and a dislike of cold weather. It ap-

peared that from the time of discharge until one month before admission the patient had suffered from cramps in his calves and forearms when they were exercised. He had gained 32 pounds since operation.

On examination the skin was dry, rough and scaly, and had a slight yellowish tinge. The heart and lungs were normal, the blood pressure 140 systolic, 90 diastolic. The liver was palpable three fingerbreadths below the costal margin.

The temperature was 97.8°F., the pulse 67, and the respirations 18.

The fasting blood sugar varied from 112 to 296 mg. per 100 cc.; the nonprotein nitrogen of the blood serum was 21 mg. per 100 cc., the carbon dioxide combining power 33 milliequiv. per liter, and the total cholesterol 150 mg. per 100 cc. Brom-sulfalein and formol-gel tests were negative. A glucose-insulin tolerance test showed slight resistance to insulin.

The basal metabolism rate varied from -14 to -30 per cent. X-ray examination of the chest showed the heart size to be within the upper limits of normal. The aorta was calcified, but not dilated, and the lung fields showed slight increase in the lung markings.

The patient was discharged two weeks after admission on thyroid, a diabetic diet and 20 units of protamine insulin daily.

Final Admission (one year later). The patient was followed in the Out Patient Department and remained well, although the dosage of thyroid had to be increased to combat the symptoms of myxedema. Suddenly four days before admission general malaise, headache, muscle pains and backache developed, with a slight cough and a temperature of 102°F. Two days later he became weak, drowsy and difficult to manage; he refused to eat, and his cough increased. At the time of admission it was found that he had not taken insulin for at least a month.

On examination the patient was drowsy, uncooperative and coughed frequently. There was facial telangiectasia, with cyanosis and a curious slate-colored pigmentation of the dry skin. The nasopharynx was reddened and edematous. Many rales were heard throughout the chest, being most marked over the right lower lobe, but there was no evidence of consolidation. The heart was normal, the blood pressure 100 systolic, 64 diastolic. The liver was palpable 4 cm. below the costal margin. The reflexes were slow and deliberate, but equal.

The temperature was normal, the pulse 95, and the respirations 20.

The urine showed a ++++ test for albumin, an olive sugar reaction and a ++ test for acetone. Ex-

amination of the blood showed a red-cell count of 3,750,000 with a hemoglobin of 11 gm. (photoelectric-cell technic), and a white-cell count of 13,100 with 82 per cent polymorphonuclears. The blood sugar was 392 mg. per 100 cc., and the carbon dioxide combining power 21.9 milliequiv. and the total base 154.5 milliequiv. per liter; the pH was 7.36. The nonprotein nitrogen of the blood serum was 35 mg. per 100 cc.

The day after admission, definite signs of consolidation had developed in the right lower lobe, with scattered areas in the left lung. The temperature had risen to 103°F., the pulse to 130 and the respirations to 30. Chemotherapy was instituted, but the patient failed rapidly and died on the fourth hospital day.

DIFFERENTIAL DIAGNOSIS

DR. JOHN R. GRAHAM: This man was a shovel polisher. It is a trade of which I have never heard, and whether it offers an occupational hazard I do not know. So far as I can make out, the past history is inconsequent. At the first admission it was evident that the patient had a protean collection of symptoms involving several systems of the body. The increased frequency of urination fits with the presence of sugar in the urine, and the high blood-sugar level serves to establish a diagnosis of diabetes. Secondly, the eye signs, the rapid pulse rate and the elevated metabolic rate point to a diagnosis of hyperthyroidism. I am sorry that the record does not include a figure for the basal metabolic rate after iodine had been administered, which would have been conclusive evidence of this diagnosis, but since a thyroidectomy was performed I think we may assume that the response to iodine was what might have been expected. From the physical examination we learn that the liver edge was palpable four fingerbreadths below the costal margin, and with such a finding I believe we are safe in assuming that the liver was enlarged. In this connection it is interesting to note that a biopsy of the skin was performed, and despite the statement of the patient's physician that his skin had become darker no abnormal pigment was observed. Finally we have a puzzling group of signs and symptoms in the chest. One wonders if the dyspnea was due to the pulmonary process or to the hyperthyroidism. I should assume that the calcified nodules near the lung root meant old tuberculosis. The sign at the right base might have been due to a high fixed diaphragm, with atelectasis or a small collection of fluid, or to a consolidating process of the right lower lobe. The evidence of the chart and the normal white-cell count

are against any very acute infection. The patient had had two or three episodes, each associated with pleural pain, increased dyspnea and sufficient disability to lead him to stop working. It seems to me that a series of pulmonary infarcts was the most likely explanation of what was going on in the chest, and the description of the x-ray findings was found consistent with this diagnosis. After operation it is evident that the symptoms of hyperthyroidism definitely regressed. Moreover it is interesting that despite the removal of the thyroid gland the diabetes apparently progressed, since insulin became necessary. The numbness complained of in the right foot may have been evidence of diabetic neuritis. At the second entry, it is evident that myxedema had developed, and it seems probable that this was secondary to the preceding thyroidectomy. The liver situation had apparently not changed significantly.

Four days before his final admission, the patient had symptoms that sound like an acute respiratory infection rather than infarct, which could hardly explain the headache, muscle pains and backache. I have little doubt that it was pneumonia. The diabetes was certainly no better. It is hard to say whether it had progressed or not. The patient seems to have been in mild acidosis. We have the added information of slate-colored pigmentation to the skin.

In trying to put this whole picture together, I find that it is hard to make all the symptoms and signs conform to one picture. There seems to be a fundamental triad of symptoms that cannot be neglected, namely, diabetes, enlargement of the liver and slate-colored pigmentation of the skin. Hemochromatosis seems to be the only thing to explain these symptoms in one patient. I have never heard of hyperthyroidism with hemochromatosis, and I can only regard this as a coincidence. We know that, in hemochromatosis, primary carcinoma of the liver is a complication in not a few cases, but I see no particular reason why we should make this diagnosis in the present case. My primary diagnosis is hemochromatosis, with pigmentation of the skin and viscera, cirrhosis of the liver and cirrhosis of the pancreas; additional diagnoses are myxedema secondary to operation, gallstones, deep phlebitis in the legs, an old process in the lungs, perhaps due to infarcts, probably some arteriosclerosis on a diabetic basis, a terminal pneumonia and diabetic acidosis.

DR. EUGENE SULLIVAN: There are one or two points worth mentioning about the case. I sent this patient in at the second admission. At that time he had spent four hours in the Out Patient Department, which is well heated ordinarily, yet he still had his overcoat on. It took about five

minutes to get a deep husky answer to any question. It is of some interest that he had been followed sporadically in the medical clinic during the preceding eight months without the detection of definite signs of myxedema. When he arrived on the wards the basal metabolic rate was recorded as low as -30 per cent. He had a well-developed myxedema. He was admitted with the added diagnosis of hemochromatosis, largely because I had the advantage of seeing a pathological report neatly tucked into the record of the first admission. Apparently not much attention had been paid to it, but there existed a careful description of hemochromatosis involving the thyroid gland. At the time I pondered whether the myxedema was partly on the basis of surgical ablation, and partly due to involvement of the remaining epithelial cells of the thyroid gland with the pigment deposit. However, most people believe that hemochromatosis affects functionally only the pancreas and the liver. After the patient arrived for his last admission I saw him in the Emergency Ward. He was sent in as a probable case of diabetic coma. It was obvious that it was not diabetic coma. He was cyanotic and mildly acidotic. He had only an olive sugar test in the urine and was a very ill man. He was so ill that although we thought he had a pneumonic infection, we were hesitant to give chemotherapy because we thought he could not stand anything at the moment except oxygen and warmth. We gave him small amounts of insulin—20 units all told. We discovered that he had taken no insulin during the previous four weeks. We marveled how he had been able to get through a whole month without insulin, and moreover to contract pneumonia, without going into diabetic coma. Several possible explanations were considered. First, a myxedema due to insufficient thyroid medication might have affected the diabetes. Secondly, regarding cirrhosis of the liver, we know that people with diabetes who develop cirrhosis may get over their diabetes clinically. Thirdly, we considered the possible effects of hemochromatosis involving the pituitary gland. Here was pigment deposit in the pancreas producing the picture of diabetes. Would hemochromatosis later involving the epithelial cells of the pituitary gland remove its diabetogenic function? There was no way of settling these points, but they made nice subjects for discussion.

CLINICAL DIAGNOSES

Hemochromatosis.

Pneumonia.

Diabetes.

Myxedema.

DR. GRAHAM'S DIAGNOSES

Hemochromatosis, with skin pigmentation and cirrhosis of liver and pancreas.
 Myxedema, postoperative.
 Diabetes, with acidosis.
 Gallstones.
 Pulmonary infarcts, old.
 Deep phlebitis of legs.
 Arteriosclerosis?
 Pneumonia, terminal.

ANATOMICAL DIAGNOSES

Hemochromatosis, involving liver, pancreas, thyroid gland and lymph nodes.
 Myxedema, postoperative.
 Bronchopneumonia, confluent.
 Pleuritis, healed fibrous.
 Icterus, slight.
 Telangiectasia of face.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: I must confess to having withheld some information from Dr. Graham. At the time of thyroidectomy we did find very large amounts of hemosiderin in the stroma of the thyroid gland—so much, in fact, that we made a diagnosis of hemochromatosis. Otherwise the histologic appearance of the thyroid gland was

consistent with a true hyperthyroidism and iodine involution.

At the time of autopsy we found a considerably enlarged, very finely granular and quite tough liver, which was of an abnormal red-brown color. The lymph nodes at the hilus of the liver were deep brown, the pancreas very distinctly brown; so that it was quite easy to make a gross diagnosis of hemochromatosis. Sections of all these organs dropped in a solution of potassium ferrocyanide and hydrochloric acid turned intense blue. Sections of the various endocrine glands were put through to see how extensive the iron deposits might be. The condition in the remaining part of the thyroid gland was essentially the same as at the time of operation. There was a small amount of pigment in the adrenal glands, virtually none in the pituitary gland. The pancreas showed a lot of pigmentation, but much more in the parenchymal cells than in the islet cells. We had again no luck in demonstrating iron in the skin, probably because of poor selection of the specimen for examination.

The mechanism of death was an extensive bronchopneumonia, and I am afraid we were so impressed with the pneumonia that we forgot to look for the scars of the infarcts, which the patient very well may have had. An ordinary routine examination of the lungs post mortem would certainly not rule out healed infarct.

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal
Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of
THE MASSACHUSETTS MEDICAL SOCIETY
and
THE NEW HAMPSHIRE MEDICAL SOCIETY

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SUBSCRIPTION TERMS \$6.00 per year in advance postage paid for the
United States Canada \$7.04 per year Boston funds \$8.52 per year for all
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on Saturday

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COMMUNICATIONS should be addressed to the *New England Journal of
Medicine* 8 Fenway Boston Massachusetts

ADULTERATED SULFATHIAZOLE TABLETS

FOR some unexplained reason two or more lots of 0.5 gm (77-gr.) sulfathiazole tablets released by the Winthrop Chemical Company, New York City, in December, 1940, contain a certain number of tablets that are composed, either in whole or in part, of phenobarbital. Practically all the bottles in these lots have been reclaimed from distributing houses, retail druggists and hospitals by representatives of the Winthrop Chemical Company and by inspectors of the United States Food and Drug Administration, but it seems likely that some are still in the hands of druggists, physicians and patients. The impure or suspicious lots are designated "MP," stamped in red ink on the up-

per right hand corner of the label on the bottle, the two known to be adulterated are labeled "MP 029" and "MP 118" respectively.

Although the administration of the adulterated tablets produces severe narcosis, practically all such patients have eventually recovered, and the chief danger lies in their use in cases of pneumonia or of other infectious diseases in which the patients are already gravely ill.

Several nonfatal cases have been reported in the vicinity of Boston, and any physician in New England, with the exception of those in the western half of Connecticut, who notes an unexplained and rapid loss of consciousness in a patient following the ingestion of a 0.5 gm (77 gr.) tablet of sulfathiazole should immediately report the fact to Inspector C. C. Sullivan of the United States Food and Drug Administration, Federal Security Agency, 408 Atlantic Avenue, Boston (Hancock 8890).

JOHN GILLIES PRIESTLEY

THE *British Medical Journal* for February 22 brings the unhappy news of the death of John Gillies Priestley on February 9. Educated at Eton and later at Christ Church, Oxford, Priestley, at the turn of the century, came under the influence of John Scott Haldane, whose friendship and early guidance determined his future career. He joined Haldane in a series of memorable investigations, the first fruit of which, issued in the *Journal of Physiology* in 1905 under the title, "The Regulation of the Lung-Ventilation," has become one of the classics of modern physiology, for it established the importance of carbon dioxide pressure in regulating the activity of the respiratory center. After this paper was published, Priestley proceeded to St. Bartholomew's Hospital in London to complete his medical qualifications, but shortly thereafter he fell ill and was obliged to spend several years in Switzerland.

Priestley was a keen sportsman and a man of unusual critical capacity. He had deep loyalties, and it was characteristic of him that, despite frail health, he volunteered immediately when World War I broke out, being commissioned on Septem-

ber 1, 1914, after which he served in France and Belgium. In 1915 he received the Military Cross and was also mentioned in official dispatches. Later in the same year he was called to England, where his training in the physiology of respiration was put to use in an important research on the aftereffects of war-gas poisoning. At the end of the war, he settled down at Oxford, and many students will recall his friendly interest and the warm hospitality of the Manor House, where he lived at March Baldon, near Oxford. They will also remember his unyielding insistence on the importance of objective evidence. He was joint author with Haldane of a laboratory text entitled *Human Physiology: A practical course*, and he joined Haldane in the preparation of the second edition of *Respiration*, a book based on the Silliman Lectures given at Yale University by Dr. Haldane.

Priestley rendered invaluable service to the Physiological Society in the preparation of a subject index of the first sixty volumes of the journal, and he succeeded his chief, Professor John Mellanby, as editor of *Physiological Abstracts*. He was responsible for the introduction of the international system of decimal classification of the scientific papers for the *Abstracts* and also for the papers in the *Journal of Physiology*. In the latter attempt to systematize the literature of physiology he had the enthusiastic support and co-operation of Sir Charles Sherrington. Priestley had broad interests in problems of general metabolism and of muscular exercise and in methods for determining cardiac output, a paper on the last subject having been published some two months prior to his death.

MEDICAL EPONYM

HEBERDEN'S NODES

The following is not a partial translated quotation, but represents the entire commentary made by William Heberden (1710-1801) on the nodes that perpetuate his name. It appears in his *Commentarii de Morborum Historia et Curatione* [*Commentaries on the History and Cure of Disease*] (Fourth edition, London, 1816).

What are those little hard knobs, about the size of a small pea, which are frequently seen on the fingers particularly a little below the top, near the joint. They have no connection with the gout, being found in persons who never had it; they continue for life and being hardly ever attended with pain, or disposed to become sores, are rather unsightly, than inconvenient, though they must be some little hindrance to the free use of the fingers.

R. W.

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

A FATAL ABDOMINAL COMPLICATION IN PREGNANCY

A twenty-nine-year-old housewife consulted her family physician at the end of the third month her third pregnancy.

She had had no children, the first two pregnancies having resulted, respectively, in a premature labor at six months and an abortion at two months. She had been operated on five years previously for chronic appendicitis. The past history was otherwise noncontributory.

Physical examination at the time of her first visit was negative. The heart was not enlarged; there were no murmurs. The lungs were clear and resonant; there were no rales. The blood pressure was 120 systolic, 60 diastolic. Vaginal examination showed the uterus anterior and enlarged to a size consistent with the period of amenorrhea.

When the patient was about six months pregnant, she became severely ill, with nausea, vomiting and abdominal pain, the pregnancy previously having been normal. She was seen daily by her physician because of the nausea and vomiting, and since enemas gave no relief, she was eventually sent to the hospital, where she was seen by a surgeon in consultation. At his first visit he believed that there was no surgical condition, and ascribed the nausea and vomiting to toxemia of pregnancy. Two days later, however, fecal vomiting occurred and there was very definite tenderness in the right hypogastrium. A laparotomy was immediately performed and revealed a twisted loop of large intestine, which was necrotic. This piece of intestine came away on manipulation, and both ends of the large bowel were brought out through

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

opening in the abdominal wall. The patient died ten days after the onset of symptoms and forty eight hours after operation.

Comment. This case represents the importance of appreciating the significance of nausea, vomiting and abdominal pain during pregnancy. Had this woman not been pregnant, there is little doubt that the surgeon would have considered an exploratory laparotomy necessary because of a provisional diagnosis of intestinal obstruction. There is no evidence in the record of a temperature reading or a white-cell count when the surgeon first saw the patient. It is possible that there was no fever, but it is quite unlikely that there was no leukocytosis. Too frequently all symptoms during pregnancy are ill advisedly assumed to be due to pregnancy. A surgical abdomen is a surgical abdomen, whether it occurs in a man or a pregnant woman, and the sooner such abdomens are opened, even if an occasional one is opened unnecessarily, the sooner the number of deaths occurring from surgical complications will be reduced.

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning April 6.

BERKSHIRE

Thursday, April 10, at 4 30 p.m., in the Bishop Memorial Building, Pittsfield. Pediatric Case Discussions. Instructor Clement A. Smith. Harry G. Mellen, *Chairman*.

BOSTON SOUTH (Fall River Section)

Tuesday, April 8, at 4 30 p.m., at the Union Hospital, Fall River. The Clinical Recognition of the Types of Jaundice and Recent Advances in Their Treatment. Instructor Franz Ingelfinger. Howard P. Sawyer, *Chairman*.

FRANKLIN

Thursday, April 10, at 8 00 p.m., in the Library of the Franklin County Public Hospital, Greenfield. Obstetric Complications with Case Histories and Clinical Problems. Instructor John Rock. Halbert G. Stetson, *Chairman*.

HAMPTON

Wednesday, April 9, at 4 00 p.m., at the Academy of Medicine, Professional Building, 20 Maple Street, Springfield, and 8 00 p.m., in the Outpatient Department of the Skinner Clinic, Holyoke Hospital, Holyoke. Head Colds and Complications. Instructor John R. Richardson. Alfonso A. Palermo, *Chairman*.

HAMPSHIRE

Thursday, April 10, at 4 15 p.m., in the Nurses Home of the Cooley Dickinson Hospital, North

ampton. Chemotherapy in the Treatment of Gonococcal Infection. Instructor P. N. Papas. Robert C. Byrne, *Chairman*.

WORCESTER

Tuesday, April 8, at 8 30 p.m., in the Nurses' Home of the Milford Hospital, Milford. Obstetric Complications with Case Histories and Clinical Problems. Instructor Roy J. Heffernan. Joseph Ashlins, *Chairman*.

WORCESTER NORTH

Friday, April 11, at 4 30 p.m., in the Nurses' Home of the Burbank Hospital, Fitchburg. Infections of the Hands and Feet. Instructor Henry C. Marble. George P. Keaveny, *Chairman*.

DEATHS

BOOTH—ERNEST L. BOOTH, M.D., of East Boston, died March 24. He was in his fifty-eighth year.

Dr. Booth attended Boston Latin School and Harvard University and received his degree from Harvard Medical School in 1908. For more than thirty years he was a school physician in Boston, and had been physician for the East Boston plant of the General Electric Company and medical examiner for three insurance companies. He was a member of the Massachusetts Medical Society and the American Medical Association.

His widow, two sons and two daughters survive him.

HOYT—EDWARD M. HOYT, M.D., of Georgetown, died March 28. He was in his eighty-fourth year.

Born in Wentworth, New Hampshire, he received his degree from Harvard Medical School in 1894. He spent a few months studying at the Rotunda Hospital in Dublin, Ireland, before starting practice in Georgetown.

Dr. Hoyt was a member of the Massachusetts Medical Society and the American Medical Association, having retired from active practice in 1936.

CORRESPONDENCE

REGIONAL FRACTURE COMMITTEES OF THE AMERICAN COLLEGE OF SURGEONS IN NEW ENGLAND

To the Editor. It might be of interest to readers of the *Journal* to know that the regional fracture committees of the American College of Surgeons in New England are endeavoring to improve the treatment of fractures.

Among the ninety-two of these regional fracture committees now operating in the United States and Canada, New England can boast of six—one for each state. Formed originally to call to the attention of surgeons, orthopedists and medical men the desirability of consolidating interest in the increasing number of fractures on the highways and their proper first aid and hospital treatment, the committees have gradually increased their scope.

The New England group is particularly fortunate in the educational field. Each regional chairman has a well organized committee, which holds a fracture symposium of its own at least once a year, the Boston teaching hospitals provide a one-day clinic for the full combined membership of the six regional committees once a year, and the New York, Philadelphia and New England groups hold a two-day clinic alternately in one of the three largest cities each year.

With three meetings a year, the members of these regional groups have an opportunity to keep informed and up to date on all accepted types of fracture treatment. These committees are active in all six states.

AUGUSTUS THORNDIKE, JR., M.D., *Secretary*,
Massachusetts Regional Fracture Committee.

319 Longwood Avenue,
Boston.

"FAITH HEALING"

To the Editor: Your issue of February, 1941, having included an article entitled, "Criminal Aspects of Faith Healing," by I. H. Rubenstein, and an editorial commenting on the article, may I request the publishing of this corrective letter?

Christian Science is not a "faith cure." Christian Science heals through an understanding of spiritual law. Faith is a component part of the healing work of Christian Science, but faith, which rests upon conviction, upon a demonstrable understanding of God's law, is far from a blind, though trusting, hope that prayer will be answered. Mary Baker Eddy writes, in her book, *Miscellaneous Writings*: "Christian Science is not a remedy of faith alone, but combines faith with understanding, through which we may touch the hem of His garment; and know that omnipotence has all power. 'I am the Lord, and there is none else, there is no God beside me'" (p. 97).

References made by the author of this article to decisions of courts in some jurisdictions seem to imply that Christian Science healing has been condemned by the courts. Findings favorable to Christian Science are not mentioned. Furthermore, practically all the decisions cited relate to occurrences of over a generation ago. They were made from the viewpoint of the then understanding of society as to what Christian Science is and what it does. As a rule society does not unanimously accept what appears to be an innovation. This is true in the arts and sciences, and in the practice of medicine.

In our tolerant and enlightened democracy, Christian Science has demonstrated its efficacy by its works. Consequently, a better understanding and recognition of its healing ministry is evidenced by the action of the citizens of our states in providing through legislative enactments that there may be treatment by prayer or spiritual means in the healing of the sick. So it is that whatever may have been the controversies before the courts in earlier times, it is clear that today healing by prayer has legal sanction and approval because the people wish it so.

The author of the article in question is apprehensive lest the "faith healer" will resort to material remedies in connection with his ministrations, that he will make physical diagnoses, prescribe and administer material remedies, and thus violate the medical-practice act. It need only be said that one who adheres strictly and in good faith to the methods of healing in Christian Science will not medically diagnose human ailments, nor will he use or administer material remedies in connection with treatment by prayer or spiritual means, for the simple and obvious reason that in so doing he would not be practicing the religion of Christian Science.

Your editorial expresses concern that those relying on prayer or spiritual means for healing may disregard quarantine and sanitary laws in cases of contagious and communicable disease. Christian Scientists carefully observe such laws and regulations. We have been told by our

leader, Mary Baker Eddy, to be law-abiding citizens. She has instructed us to "obey strictly the laws that be" (*Message to The Mother Church for 1901*, p. 34).

Mr. Rubenstein refers to "exploiting faith healing for commercial profit," and makes a distinction between treatment given in an office building and treatment given in the practitioner's own home or that of the patient or in a church edifice. If the "effectual fervent prayer" of a Christian Scientist is beneficial, can it be said that it is harmful or less beneficial if compensation is given therefor? Jesus, when sending forth his disciples under the injunction to preach the gospel and heal the sick, said, "The labourer is worthy of his hire." If the ministry in general in its redemptive work is entitled to compensation, and justly so, can it be said that Christian Scientists who devote their entire time to the practice of a religion that heals the sick, are less worthy? In her book, *The First Church of Christ, Scientist, and Miscellany*, Mrs. Eddy says: "Till Christian Scientists give all their time to spiritual things, live without eating, and obtain their money from a fish's mouth, they must earn it in order to help mankind with it. All systems of religion stand on this basis" (p. 216).

With respect to the point raised by the author relative to "criminal responsibility of parents" who do not supply medical care for their children, because of "a conscientious belief in faith healing," it will appear that the cases he has cited and his approach to the question must be considered and judged from the viewpoint of society at that time. The author refers to "necessary medical care." What is considered "necessary" in one age may not be so considered in another. The experience of mankind has demonstrated that the word "necessary," as applied to the healing of its ills, is not confined to "necessary medical care," but includes treatment by prayer or spiritual means, as countless of its beneficiaries can attest.

Speaking in a decision cited by the author (People v. Cole), regarding the construction of the statute under consideration in that case, Chief Judge Bartlett, of the Court of Appeals of New York, said, "I deny the power of the legislature to make it a crime to treat disease by prayer."

Many legislatures in our country have specifically provided that parents may have for their children the care and treatment of their choice. One notes an ever-increasing tendency in federal and state legislation to safeguard the interests of parent and child in permitting the remedial care of their own selection and in providing that a child is not to be considered as neglected who has "other remedial care."

Christian Scientists rely on prayer or spiritual means for the healing of the sick, without the use of material remedies. Christian Science is not a "faith cure" nor an emotional process, but is a restatement, in modern times, of the primitive Christian healing practiced by Jesus. In her famous textbook, *Science and Health with Key to the Scriptures*, Mrs. Eddy writes: "The physical healing of Christian Science results now, as in Jesus' time, from the operation of divine Principle, before which sin and disease lose their reality in human consciousness and disappear as naturally and as necessarily as darkness gives place to light and sin to reformation" (Pref. xi).

HERBERT W. BECK,
Christian Science Committee on Publication.

107 Falmouth Street,
Boston.

REPORT OF MEETING

NEW ENGLAND SOCIETY
OF PHYSICAL MEDICINE

At a regular meeting of the New England Society of Physical Medicine at the Hotel Kenmore on January 22, Dr Hallowell Davis discussed the Clinical Significance of the Electroencephalogram.

Dr Davis believes that the method is valuable for diagnosis but not for treatment. In contrast to the electrocardiogram the rate is faster and voltage very much less. The latter is one reason for the relatively late discovery, another being the irregularities of rate and amplitude, which were originally considered insignificant. The speaker briefly discussed various methods of placing the electrodes. Slides were then shown of the different types of waves. Normally there may be some variation in the height of the wave, but this is usually constant for each patient. There is a prominence of the ten cycle rhythm in the intermediate waves, there is more variation but there is a stable base line. In abnormal tracings the rates are grossly irregular, and the waves have characteristic shapes.

A motion picture was then shown demonstrating the maturation of the brain wave pattern with increasing age. At ten days there are practically no waves, at six months irregularities are characteristic, being slow, of wide amplitude and of random pattern, at five years there is more regularity, some faster components and the fundamental rhythm appears in runs. At seven years the fundamental rhythm becomes more prominent, is decreased or absent on opening the eyes, and varies with the state of sleep. Finally, the characteristic adult pattern was shown. The individuality of pattern is similar to that of handwriting, but the close resemblance of patterns in identical twins seems to indicate that it is an inborn characteristic. Brain waves are not exclusive with human beings for similar tracings may be found in animals of very low order.

Dr Davis discussed conditions that cause a variation in brain waves. The amplitude is decreased most surely by opening the eyes. Arithmetical problems may or may not cause a diminution depending on how sensitive the patient is about being put on the spot. When the patient goes to sleep, the waves become larger and slower, manifesting the same depression as other physiologic activities. Oxygen want acts by a similar mechanism as does a low blood sugar level such as that occurring in the insulin treatment of schizophrenia. Alcoholic intoxication causes surprisingly little depression in the deeper stages and there is a slow return to normal proportional to the alcoholic content of the blood. It increased intracranial pressure the pattern becomes slow, irregular and disorganized, no localization being possible when the increased pressure is generalized. In such cases multiple tracings are advantageous.

Among conditions that cause an increase in the pattern are convulsions, whether of Metrazol origin or from epilepsy. The possibility that the increased waves during Metrazol treatments may be of muscular origin has been ruled out in experimental animals by the use of curare. In epilepsy there are besides the characteristic waves during a seizure the telltale tracings between seizures. In the grand mal type of epilepsy, there is an increase in amplitude and rate with some slow components. The petit mal seizure is usually accompanied by the characteristic spike and wave pattern. The psychomotor attack results in variable tracings with a six per second rate. In conclusion, Dr Davis stated that the electroencephalogram is valuable

for localizing intracranial disease, detecting epilepsy and following up epileptic treatment.

The second speaker was Dr Robert Schwab, who recounted how the number of such studies at the Massachusetts General Hospital had increased from 20 per month in 1937 to 250 at the present. Dr Schwab stated that, besides the diagnosis of epilepsy and the localization of tumors, the method may be employed for recording other emanations such as those from the neuromuscular system. The speaker then discussed its use in the localization of tumors. Five hundred electroencephalographic studies have been carried out at the Massachusetts General Hospital and they are grouped as positive, uncertain and negative for tumor. Of those in the first group 40 of 45 cases have been verified and in the third group the results have been approximately 90 per cent correct. This compares favorably with the results obtained with myelography, and where both agree the results have been 100 per cent correct. From a practical standpoint it is well to be aware that the use of electrocautery in the operating room nullifies the electroencephalogram. It was also pointed out that by this method one is unable to differentiate subdural hematoma or brain abscess and tumors.

The third speaker was Mrs Pauline Davis, who has had considerable experience with this method in mental institutions. She has found that poor co-operation may be due to a real inability of the patient to concentrate, as manifested by the slow tracings in such patients. In an attempt to correlate the diagnosis with the brain wave pattern Mrs Davis divided the tracings into three groups according to their form and then looked up the diagnoses of these patients. It was found that the 244 schizophrenic patients fell into these three groups and that the type of schizophrenic corresponded well in the majority of cases. The patients in the first group with normal tracings were paranoid and usually stable on the ward; the second group revealed dysrhythmic waves and the patients were catatonic and unpredictable in their behavior; the third group had choppy patterns and the patients were also catatonic but stable although retarded, mute and unresponsive.

Occasionally some underlying disease was found to be responsible for the insanity. In this group in which the patients show organic damage Metrazol therapy is probably contraindicated for many show increased damage after treatment as recorded by the electroencephalogram. Even in those who show a good temporary response, there is usually some eventual damage, with failure of the brain to return to normal activity following therapy. It seems therefore that this is a good method for determining the status of the brain prior to treatment and for following the course of treatment.

During the discussion Dr Davis stated that the locus of origin for brain waves is well localized in the gray matter despite the physiologic interconnections of various parts of the brain. The pattern in hibernation it was stated would probably be slow, as in sleep. It is impossible to state whether this latter phenomenon is due to anoxia but Dr Davis believes that this is not the explanation. Refrigeration experiments at the McLean Hospital have been carried out but it has been found that the extreme shivering interferes too greatly with the results.

In discussing schizophrenics Dr John Romano pointed out that slow waves may be found in other problem patients. And although psychologists admit the heterogeneity of schizophrenics he considers it premature to believe that any correlation of types with brain waves is possible at present.

The so-called "frequency analyzer" may have some advantages, but it cannot record wave form, which is so important in epilepsy, for example. In answer to the question how long a record is necessary before epilepsy may be diagnosed or ruled out, it was stated that 90 per cent of positive clinical patients revealed some abnormality within ten minutes, or within three minutes during over-ventilation. Most of the other 10 per cent reveal characteristic tracings if several tests are carried out on successive days. It was pointed out that about 10 per cent of normal people with abnormal brain-wave patterns have moderately abnormal tracings, whereas none are so markedly pathologic as those among the frankly deranged. It was emphasized that a person who is clinically free of epilepsy may be able to pass on the trait genetically.

In the localization of deep tumors, the results have so far been more uncertain than in the more superficial ones. Differentiation between idiopathic epilepsy and the post-traumatic type may often be made by the generalized irregularities of the former, compared with the focal derangements in the latter. Mrs. Davis pointed out that the electroencephalogram in the depressed manic-depressive patient merely swings in his rare moments of manic activity toward the normal.

NOTICES

ANNOUNCEMENTS

DR. BERNARD APPEL announces the removal of his office from 483 Beacon Street, Boston, to 281 Ocean Street, Lynn.

DR. LOUIS E. WOLFSON announces the reopening of his office at 113 Bay State Road, Boston, for the resumption of his practice.

BOSTON DOCTORS' SYMPHONY ORCHESTRA



The Boston Doctors' Symphony Orchestra will rehearse under Alexander Thiede, formerly concertmaster of the Cleveland Symphony Orchestra, every Thursday at 8:30 p.m. Those interested in becoming members should com-

municate with Dr. Julius Loman, Pelham Hall Hotel, Brookline (BEA 2430).

SOUTH END MEDICAL CLUB

The next regular meeting of the South End Medical Club will be held at the headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston, on Tuesday, April 15, at 12 m. Dr. Richard Chute will speak on "The Present-Day Treatment of Prostatism."

Physicians are cordially invited to attend.

TUFTS CHAPTER OF ALPHA OMEGA ALPHA

The Tufts Chapter of Alpha Omega Alpha will hold its annual lecture at Tufts College Medical School, Room 5, Thursday, April 10, at 4:15 p.m. Dr. Harold D. Chope will speak on "Public Health and National Defense."

All interested are cordially invited to attend.

TUFTS MEDICAL ALUMNI LECTURE

The annual alumni lecture of the Tufts College Medical School will be given at the medical school on Wednesday,

April 9, at 4 p.m. Dr. Sara M. Jordan, '21, will speak on "Gastrointestinal Diseases."

Physicians and medical students are cordially invited to attend.

HOSPITAL COUNCIL OF BOSTON

The annual meeting of the Hospital Council of Boston will be held at the Palmer Memorial Hospital, 195 Pilgrim Road, Boston, on Tuesday, April 15, at 12:30 p.m.

PROGRAM

Current Legislation. Dr. Henry M. Pollock.
Uniform Hospital Accounting. Mr. Frank E. Wing.
Convalescence and the Nursing Home Information Bureau. Miss Carrie M. Hall, R.N.

Members of the medical profession are cordially invited to attend. The charge for luncheon will be 75 cents. Reservations should be made before April 12 (LIB 8515).

EVANS AUDITORIUM

The first of a series of lectures by Dr. Albert B. Ferguson on "Roentgenology of the Bones and Joints" will be delivered at Evans Auditorium, 78 East Concord Street, Boston, on Monday, April 14, at 7:30 p.m.

The medical profession is invited.

HARVARD MEDICAL SOCIETY

The next meeting of the Harvard Medical Society will be held in the Peter Bent Brigham Hospital amphitheater on Tuesday, April 8, at 8:15 p.m.

PROGRAM

Presentation of cases.
Disabilities in Reading and Their Remedying. Professor Walter F. Dearborn, Harvard University.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, APRIL 6

MONDAY, APRIL 7

12:15-1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.

TUESDAY, APRIL 8

*9-10 a.m. Pancytopenia. Drs. William Dameshek and E. B. Miller. Joseph H. Pratt Diagnostic Hospital.

12:15-1:15 p.m. Clinicoroentgenologic conference. Peter Bent Brigham Hospital amphitheater.

8:15 p.m. Harvard Medical Society. Peter Bent Brigham Hospital amphitheater.

WEDNESDAY, APRIL 9

*9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

*12 m. Clinicopathological conference. Children's Hospital.

4 p.m. Tufts Medical Alumni lecture. Dr. S. M. Jordan. Tufts College Medical School.

THURSDAY, APRIL 10

*8:30 a.m. Combined clinic of the medical, surgical, orthopedic and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital, at the Children's Hospital.

*9-10 a.m. The Problem of Vasomotor Rhinitis. Dr. L. R. Weinstein. Joseph H. Pratt Diagnostic Hospital.

*4:15 p.m. Public Health and National Defense. Dr. Harold D. Chope. Tufts Chapter of Alpha Omega Alpha. Tufts College Medical School, Room 5.

FRIDAY, APRIL 11

*9-10 a.m. Certain Aspects in the Diagnosis and Treatment of Contagious Diseases. Dr. E. H. Place. Joseph H. Pratt Diagnostic Hospital.

SATURDAY, APRIL 12

*9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

*Open to the medical profession.

APRIL 10—New England Society of Psychiatry. Page 531, issue of March 20.

- April 10—Pentucket Association of Physicians Page 263 issue of August 15
 April 13—Free public lecture Quincy City Hospital Page 436 issue of Mar 6
 April 14—Lecture Evans Auditorium Page 624
 Apr 15—South End Medical Club Page 624
 April 15—Hospital Council of Boston Page 674
 April 21-25—American College of Physicians Page 1065 issue of June 20
 April 25—Salem Tumor Clinic Page 579 issue of March 27
 April 28-30—American Academy of Physical Medicine Scientific session Page 59 issue of March 27
 Apr 30—Boston Society of Biologists Page 59 issue of March 27
 May 5-9—American Association of Industrial Physicians and Surgeons and American Industrial Hygiene Association Page 484 issue of March 13
 May 13-16—National Gastroenterological Association Hotel Commodore New York City
 May 21-22—Massachusetts Medical Society Boston
 May 28-June 2—American Board of Obstetrics and Gynecology Page 265 issue of February 6
 May 30-31—American Heart Association Hotel Statler Cleveland
 May 30-June 2—American College of Chest Physicians Hotel Statler Cleveland Ohio
 June 2-6—American Medical Association Cleveland Ohio
 October 14-17—American Public Health Association Page 579 issue of March 27

DISTRICT MEDICAL SOCIETIES

- ESSEX SOUTH
 May 14—Relation of the Doctor to the Law Mr Leland Powers New Ocean House Swampscott.
 FRANKLIN
 May 13—This meeting will be held at 11 a.m. at the Franklin County Hospital Greenfield
 NORFOLK
 May 8—Censors meeting Hotel Puritan
 SUFFOLK
 April 30—Page 604 Issue of October 10
 May 1—Censors meeting Page 261 issue of February 6
 WORCESTER
 April 9—Hahnemann Hospital Worcester
 Supper at 6:30 p.m. followed by a business meeting and scientific program

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

- Williams Obstetrics* By Henricus J Stander, M.D., professor of obstetrics and gynecology, Cornell University Medical College, obstetrician and gynecologist in-chief, New York Hospital, and director of the Lying In Hospital, New York City Eighth edition 8°, cloth, 1401 pp., with 13 plates and 704 illustrations New York D Appleton Century Company, Incorporated, 1941 \$10.00
The Care of the Psychiatric Patient in General Hospitals By Franklin G Ebaugh, M.D., director, Colorado Psychopathic Hospital, professor of psychiatry, University of Colorado School of Medicine, and director, Division of Psychiatric Education, National Committee for Mental Hygiene, New York City 8°, cloth, 79 pp Chicago, Illinois American Hospital Association, 1940 \$1.00
Age Morphology of Primary Tubercles By Henry C Swensy, M.D. medical director of research, Municipal

Tuberculosis Sanitarium, Chicago, and research associate, Department of Physiology, University of Chicago 8°, cloth, 265 pp., with 73 illustrations Springfield, Illinois Charles C Thomas, 1941 \$5.00

Manual of Physical Diagnosis With special consideration of the heart and lungs By Maurice Lewison, M.D., professor of physical diagnosis, University of Illinois College of Medicine, consulting physician, Cook County Hospital and attending physician, Mount Sinai Hospital, Chicago, and Ellis B Freilich, M.D., associate professor of medicine, University of Illinois College of Medicine, professor of medicine, Cook County Graduate School of Medicine, attending physician and chief of Tuberculosis Staff, Cook County Hospital, consultant to the Chicago Municipal Tuberculosis Sanitarium, attending physician, University Hospital, and associate attending physician, Mount Sinai Hospital In collaboration with George C Coe, M.D., instructor of medicine, University of Illinois College of Medicine, associate physician, Cook County Hospital, and clinical assistant, Mount Sinai Hospital 8°, cloth, 317 pp., with 75 illustrations Chicago The Year Book Publishers, Incorporated, 1941 \$3.00

The Therapy of the Neuroses and Psychoses A socio-psychobiologic analysis and resynthesis By Samuel Henry Kraines, M.D., associate in psychiatry, University of Illinois, College of Medicine, and assistant state alienist, State of Illinois 8°, cloth, 512 pp Philadelphia Lea and Febiger, 1941 \$5.50

Anus—Rectum—Sigmoid Colon Diagnosis and treatment By Harry Ellicott Bacon, M.D., clinical professor of proctology, Temple University School of Medicine, associate professor of proctology, Graduate School of Medicine, University of Pennsylvania, visiting proctologist, St Luke's and Children's Hospital, proctologist, National Stomach Hospital, consultant proctologist, Mercy Hospital, and consultant proctologist, Paul Kimball Hospital, Lakewood, New Jersey Introduction by W Wayne Babcock, M.D., professor of surgery, Temple University School of Medicine Foreword by J P Lockhart Mummery, M.B., B.C. (Cantab.), F.R.C.S. (Eng.), emeritus surgeon, St Mark's Hospital, London, England Second edition 8°, cloth, 857 pp., with 507 illustrations Philadelphia J B Lippincott Company, 1941 \$8.50

Born that Way By Earl R Carlson, M.D. 12°, cloth, 174 pp New York The John Day Company, 1941 \$1.75

Electrocardiography in Practice By Ashton Graybiel, M.D., instructor in medicine, Courses for Graduates, Harvard Medical School, research associate, Fatigue Laboratory, Harvard University, and assistant in medicine, Massachusetts General Hospital, and Paul D White, M.D., lecturer in medicine, Harvard Medical School, and physician, Massachusetts General Hospital, in charge of the Cardiac Clinics and Laboratory 8°, cloth, 319 pp., with 272 illustrations Philadelphia and London W B Saunders Company, 1941 \$6.00

The American College of Physicians Its first quarter century By William Gerry Morgan, M.D., LL.D., Sc.D., professor of gastroenterology and emeritus dean, Georgetown University School of Medicine, Washington, D.C. 4°, cloth, 275 pp., with 36 illustrations Philadelphia American College of Physicians, 1940 \$2.00

Routine Practices Medical Service of the Peter Bent Brigham Hospital Compiled by the members of the Medical Service 8°, cloth, 145 pp Boston Peter Bent Brigham Hospital, 1940 \$1.00

The Medical Clinics of North America. Vol. 24, No. 6, November 1940: Philadelphia Number. With three-year cumulative index, Vol. 22, 23, and 24 (1938, 1939 and 1940). 8°, cloth, 325 pp., with 35 illustrations and 12 tables. Philadelphia and London: W. B. Saunders Company. \$2.67.

The Medical Clinics of North America. Vol. 25, No. 1, January, 1941: Chicago Number. 8°, cloth, 302 pp., with 35 illustrations and 11 tables. Philadelphia and London: W. B. Saunders Company, 1941. \$2.67.

Textbook for Male Practical Nurses. By Gayle Coltman, R.N. 12°, cloth, 215 pp., with 7 illustrations. New York: The Macmillan Company, 1941. \$2.00.

Hospital Formulary and Compendium of Useful Information. Compiled by the University of California. 16°, cloth, 270 pp. Berkeley and Los Angeles: University of California Press, 1941. \$2.00.

The Voice Governor: Give it a chance: Correct body mechanics does it. By Ralph M. Harper. 8°, cloth, 142 pp., with 40 illustrations. Boston: E. C. Schirmer Music Company, 1940. \$2.00.

BOOK REVIEWS

Surgery of the Hand. By R. M. Handfield-Jones, M.C. M.S., F.R.C.S. 8°, cloth, 140 pp., with 95 illustrations. Baltimore: Williams and Wilkins Company, 1940. \$4.50.

This book deals with surgical affections of the hand and discusses their diagnosis and treatment in detail. No new facts are presented, but the old ones are so important as to bear frequent repetition. The author has maintained throughout this work a healthy emphasis on early motion in infections of the hand. There is included a timely chapter on prevention of serious sepsis from minor injuries, and the use of the sulfonamide group is given an important place in the management of sepsis. It is interesting to note that the author recommends passive venous congestion in the treatment of acute lymphangitis—a measure that has been largely abandoned in this country.

This book will serve as a valuable reference for those who are learning about and those who are handling infections of the hand.

Arthritis and Allied Conditions. By Bernard I. Comroe, M.D. 8°, cloth, 752 pp., with 200 illustrations. Philadelphia: Lea and Febiger, 1940. \$8.50.

This meaty and profusely illustrated volume is probably the most comprehensive American survey thus far published in book form of the field of the rheumatic diseases. Over 2700 bibliographic references attest the wide scope of the author's review of the literature on these conditions. The illustrations are excellent, although largely chosen from other textbooks and monographs.

The forty-seven chapters not only deal with the pathology, etiology and general therapy of the different types of arthritis, but also describe in useful detail many of the special technics of administration, such as fever therapy, the use of gold salts, massage and exercises. Helpful warnings are given concerning the possible dangers to be escaped and the pitfalls to be avoided in therapy.

The reader is likely to wish at times that the author had been less dispassionate and had expressed in more definite phraseology his personal convictions and recounted his own experiences, as he has for example in his discussion of vaccine therapy. In reference to this much mooted question, the author believes from clinical evi-

dence that vaccine therapy is an "integral part" of the therapy of rheumatoid arthritis, but that an honest answer to the question, "How do vaccines work?" is, "No one knows."

The allied conditions cover a wide field, as the titles of certain chapters suggest, such as "Internal Derangement of Joints," "The Painful Shoulder" and "Painful Feet," as well as the subheadings, "Treatment of Sciatica," "Sprains," "Acute Bone Atrophy" and "Ganglion."

This book can be highly recommended as an excellent and up-to-date reference book that is worthy of the perusal of all internists and orthopedic surgeons dealing with these protean diseases, which are of supreme importance both medically and economically.

Pharmacology and Therapeutics. By Arthur R. Cushny, M.D., LL.D., F.R.S. Twelfth edition, thoroughly revised by C. W. Edmunds, M.D., and J. A. Gunn, M.D., D.Sc. F.R.C.P. 8°, cloth, 852 pp., with 66 illustrations. Philadelphia: Lea and Febiger, 1940. \$6.50.

Cushny's standard work on pharmacology and therapeutics has been thoroughly revised since the last edition four years ago. It is interesting to note that 1941 marks the forty-first year since this work first appeared. It has held its own for this long period, and is still a standard textbook. No greater tribute could come to any author than to have his book last through more than two generations of medical students and physicians. The student of today is thus reading the same book in his course of medical education that his father or those of that generation were brought up on.

Applied Pharmacology. By Hugh Alister McGuigan Ph.D., M.D. 8°, cloth, 914 pp., with 41 illustrations. St. Louis: C. V. Mosby Company, 1940. \$9.00.

Although the idea of this book is admirable, some of the execution is disappointing. It contains much useful information, but is not sufficiently complete, pharmacologically or clinically, to be as valuable as it might be. For example, the author fails to discuss the important differences in the disposal of various barbiturates in the body, and many inaccurate statements, such as that Luminal is used at bedtime in cases of epilepsy, are found. The idea and arrangement of the book are excellent. It is particularly valuable in giving the chemistry of some of the drugs.

Subsequent editions—with more careful editing—should make it a very valuable addition to any physician's library.

Principles of Surgical Care, Shock and Other Problems. By Alfred Blalock, M.D. 4°, cloth, 325 pp., with 13 illustrations. St. Louis: C. V. Mosby Company, 1940. \$4.50.

In this volume the author discusses the care of the surgical patient. He emphasizes the avoidance of complications but also includes their management when they arise.

The best part of the work is that devoted to shock or peripheral circulatory collapse. The author is an eminent authority in this field and has made many clinical and laboratory contributions. Although his main emphasis has been on the loss of fluid from the blood stream into the extracellular tissue spaces, his summary of the whole problem of shock is as clear and fair a statement as any that has recently appeared. The sections of the book on anesthesia and treatment may be found in any textbook of surgery, but seldom have been better documented.

The book will have an especial appeal to those who follow closely the trends in modern surgery.

The New England Journal of Medicine

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VOLUME 224

APRIL 10, 1941

NUMBER 15

THE CONVALESCENT CARE OF CHILDREN WITH HEART DISEASE DUE TO RHEUMATIC FEVER

A SURVEY OF THE PROBLEM OF THE CARE OF CHILDREN WITH RHEUMATIC HEART DISEASE*

PAUL D. WHITE, M.D.†

BOSTON

THE following three articles pertain to a joint five-year study of the problem of the care of children with rheumatic heart disease by the Children's Mission to Children, the Children's Cardiac Clinic at the Massachusetts General Hospital, and the Committee for the Home Care of Children with Heart Disease. This study began in 1934 and ended in 1939. The details of the survey are included in the papers, but a brief statement of the history of the interest of the three organizations in the child with rheumatic heart disease, and the general conclusions of the study are worthy of emphasis. The aim was twofold: to determine the value of the relatively intensive care of these children, and to ascertain the best way to utilize the resources available for such care.

The Children's Mission to Children, founded in 1849, has had an interesting and useful function, concentrating in the last forty years on the foster-home placement of children who could not remain with their own families. Since 1914, it has specialized in this vitally important work for children with medical problems, at the suggestion of Dr. Richard Cabot, who found that many children remaining for a long time in hospital wards became "institutionalized" and retarded in their physical and mental convalescence. Gradually the children with rheumatic fever and rheumatic heart disease made up an increasing proportion of the total, and bedcare began to be arranged. Five special nursing homes were developed, with medical supervision, nursing service, social case-work service, visiting teaching provided by the Boston School Department, occupational therapy, and last but not least, a truly homelike atmosphere.

With these resources and with a strong desire to contribute wisely, it was natural for the Children's Mission to join the other two groups in 1934 at the inauguration of the five-year study, which was undertaken to determine how best to care for the child with rheumatic heart disease.

The Children's Cardiac Clinic of the Massachusetts General Hospital was one of the pioneers in the country, starting out in 1912 under the guidance of Dr. Fritz B. Talbot, with the help of the Social Service Department of the Massachusetts General Hospital. Dr. Talbot's program included hospital care, supervision of bedcare at home, provision for amusement, convalescent homes, vocational guidance and prolonged supervision. The medical supervision of the clinic, begun by Dr. Richard S. Eustis and taken up later by the present writer, with the aid of Dr. Howard B. Sprague, Dr. Edward F. Bland, Dr. T. Duckett Jones and many others, has been continuously and intensively carried on with constant development and scientific contributions of value, and with very close affiliation with the House of the Good Samaritan. The most vital factor in the clinic's growth, however, has been the pioneer social-service work of Miss Edith M. Terry and her associates, Miss Katherine Breed and Miss Lorena M. Love, who have made world famous this aspect of the work of the Children's Cardiac Clinic. The question of the fundamental and ultimate value of all the time and money and effort expended in this work for children with rheumatic heart disease had often been raised in years past, and it was therefore natural for the clinic, with Dr. Bland's and Miss Terry's guidance, to join in the five-year study referred to above.

The Committee for the Home Care of Children with Heart Disease was organized under the

*This and the three following papers constitute a series from the Massachusetts General Hospital on behalf of the Children's Mission to Children and the Committee for the Home Care of Children with Heart Disease.

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leadership of Mrs. Fritz B. Talbot to help fulfill the second and third steps in Dr. Talbot's program, which had been started by the Social Service Department in 1912. This committee took over the program in 1914 and has carried out its mission in the fullest degree, initiating and supporting the work of Miss Terry and her helpers for many years, and bringing to the homes and families of the children, as well as to the children themselves, help, cheer, instruction, material aid, and perhaps most important of all,—an innovation and yet a crying and obvious need,—expert medical attention. Thus it was natural for this committee to join the other two groups in the five-year survey.

The results of the study are of much interest, although hard and fast conclusions cannot be drawn, even from this intensive investigation, because of the short space of time and the small number of cases. A lifetime of observation, with thousands of children studied as carefully as these, would be required to permit dogmatic statements. It is also important to realize that only in the most recent generation has the extensive scope of the problem of the rheumatic heart been adequately appreciated. Due recognition must be given the following factors: the long course of active infection lasting for many months and frequently for years; the temporary heart-muscle involvement, with dilatation of the heart during the time of active infection; the good recovery that usually ensues despite chronic valvular deformity; and fresh recurrences of rheumatic fever, precipitated by many different episodes, most commonly by acute upper respiratory infections with the hemolytic streptococcus.

The chief lesson learned from this five-year study is that long and adequate bedcare for children with acute rheumatism or acute rheumatic heart disease is best carried out when the environment is most carefully arranged and homelike, with intelligent nursing, expert and readily available medical attention, food adequate in calories and vitamins, protection against colds, and effective measures in the form of recreational and occupational therapy to secure and to hold the co-operation of the children themselves. Treatment in the early days of the illness and when the disease is highly active may best be begun in the hospital, general or special (like the House of the Good Samaritan), with transfer after a few weeks, as circumstances allow, to the children's own homes if prepared and adequate, or to special foster homes such as those developed by the Children's Mission. The co-ordination of the large general hospitals, the House of the Good Samaritan, the Children's Mission, the Committee for the

Home Care of Children with Heart Disease and other resources in this service is one of the most important results of this five-year study. Equally significant is the vital contribution of bringing expert medical attention in addition to social service to the children's own homes and to the foster homes, a serious omission in days gone by. Another lack, which still exists, is that of adequate technical aid in the study of the blood of the children in foster homes and their own homes. In this disease all technical aid available is often needed in following the course of the infection. Leukocyte and erythrocyte counts, blood sedimentation rates and even electrocardiograms are helpful in doubtful cases and in decisions concerning the quiescence of active infection. Still another vital need and one of the most important problems of all, which has been as yet only partly solved, although its significance is fully recognized, is the protection of the child from colds, which are by far the commonest and most serious cause of exacerbations in subacute and quiescent cases of rheumatic fever. In institutions and in homes, such infections commonly involve many of the inmates, despite various precautions; experience to date has been that the best foster homes give the best protection. Finally, the morale and education of the children, very important factors in securing the co-operation of both children and parents in the treatment, have been maintained at a high level, with excellent results.

Is all this worth while? That important question, the first raised by all the groups at the beginning of the study, remains incompletely answered. Certainly from the standpoint of education of children and their families concerning this important disease, of enlisting their wholehearted co-operation, of making their lives happier and more useful, and of treating the disease more intelligently, great strides have been made. How many lives have been actually saved or how many hearts protected from greater damage one cannot say, since the data are as yet insufficient. Some children still die despite the most exquisite care of the sort outlined above, but as yet there has not been an adequate study of control cases, that is, cases which in the same environment and interval of time have been relatively neglected both medically and socially.* It is hoped and expected that our special care has reduced, at least somewhat, both mortality and morbidity in this group of children; even if it has not, the greater comfort and happiness that have resulted from this co-operative endeavor in themselves repay the cost and toil.

*An effort is being made to collect data from a control group for comparison with the findings in the group of children who have received intensive care.

RHEUMATIC FEVER IN CHILDHOOD*

With Especial Reference to a Five-Year Study of Home and Foster-Home Care

EDWARD F. BLAND, M.D.†

BOSTON

THE acute phase of rheumatic fever, when it occurs, usually subsides in a few weeks, but careful study has shown that signs of continued activity of the rheumatic process persist thereafter for months, and occasionally for years. Some of these signs are obscure and are evident only when diligently sought both by clinical observation and by laboratory tests. There is now general agreement that it is important to protect the heart by rest in bed, not only during the relatively short acute phase, but also throughout the illness until all evidence of rheumatic activity has subsided. It is also especially essential to protect the patient from respiratory infection during this unstable period, since recrudescences of rheumatic activity are usually precipitated by colds and sore throats. The acceptance of these two general principles in the management of patients with rheumatic fever has created new and formidable problems.

Facilities at home, or in hospitals when necessary, for treatment of the acute phase can usually be provided. The subsequent care for months in bed is necessarily more difficult to arrange. In many places this has become increasingly a community responsibility, since the disease prevails in families with low incomes whose homes are usually not suitable for prolonged bedcare. At present relatively few institutions are available for this special purpose; more are certainly needed. In the meantime, other necessarily less costly methods have been employed to provide this long rest in bed.

Because of this problem, a five-year program was undertaken in Boston in 1934 to study further the merits and limitations of convalescent care as provided at home and in foster homes under closer medical and social-service supervision than had hitherto been attempted. Under the guidance of a committee of which the late Dr. George H. Bigelow was the original chairman, certain foster homes of the Children's Mission were made available to the Cardiac Clinic of the Massachusetts General Hospital for a co-operative study of the problems involved. It was planned that when possible the patient's own home was to be

given first choice for convalescence. To this end, it was evident to those of us who had followed the course of clinic patients that in addition to medical supervision in the home a detailed study of individual and family needs in each case would be essential. Furthermore, past experience had emphasized the importance of happily occupying the minds of these youthful patients, for on this often depended the success or failure of otherwise well-planned therapy. Special attention directed to this phase of the program has yielded interesting methods, which are described in the papers by Miss Edith M. Terry and Mrs. Virginia B. Ebert.

The project as originally planned for five years has terminated, and although the joint program is continuing, it now seems appropriate to summarize the results to date with this specially studied group of patients.

TYPE OF CONVALESCENT CARE

During the five-year period from 1934 through 1939, children between five and fifteen years of age with rheumatic fever were accepted from the wards and clinics of the Massachusetts General Hospital for convalescent care. After social investigation of the home conditions and medical appraisal of the severity of the disease, a decision was made of the desirability of home or of foster-home care. Many factors, some only remotely related to the patient's illness, necessarily entered into this decision. The tendency throughout the study was to stress bedcare at home when it seemed at all feasible. Foster-home facilities were largely reserved for those children who required more expert supervision and nursing care than they could have received in their own homes. Medical-social workers have kept in touch with each patient at frequent intervals. All children have been visited by the physician in charge at monthly intervals, and oftener in special cases. The assistance of community-health nurses was invaluable in following the sicker group. Finally, it became evident soon after the project started that the intelligent management of these patients required ultimately the aid of certain minimal laboratory guides — the most helpful of which was the sedimentation rate of the red blood cells. The majority of these tests were made by a part-time technician

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who visited the homes, but some were carried out later at the hospital, when the patient's clinical improvement warranted a clinic visit.

After all evidence of infection had subsided, these patients were allowed out of bed, increasing the time an hour a week, and at the end of four or five weeks they returned to the outpatient clinic and from there their subsequent course was directed. The rheumatic process in this group was considered inactive when, in the absence of anti-rheumatic drugs, there were: freedom from rheumatic symptoms, such as arthritis, or arthralgia, abdominal and precordial pain, and nosebleeds; absence of signs such as pallor, nodules, chorea and erythema multiforme; a satisfactory general condition, which included a normal appetite and a progressive weight gain; a rectal temperature consistently under 100°F.; a normal sedimentation rate and white-cell count; and a normal auriculo-ventricular conduction time by electrocardiogram, corrected for the age of the patient.

Following this general plan 64 patients were studied. A certain number were accepted relatively early after the project started, because of previous rheumatic fever that, although inactive at the moment, was considered likely to cause trouble at a later date. Of this group there were 10 in whom the rheumatic process remained quiescent throughout the period of observation, and hence they may be dismissed without further comment. The remaining 54 patients required active treatment for rheumatic infection. In 38 cases the illness represented the initial attack, whereas the remaining 16 patients had had previous attacks of rheumatic fever.

A summary of the type of bedcare found necessary for this group may serve as a helpful index for those planning similar programs elsewhere. In 26 cases, or 48 per cent of the 54 active cases, ward care in the general hospital was necessary during the more acute stage of the disease. Two admissions were necessary for 6, and 1 patient was admitted three times. The average stay on the ward was four weeks. This represents a much shorter period of hospitalization than would have been necessary if the project had not been in operation. Foster homes were employed in 26 cases, but in only 10 for the entire duration of the convalescence; the remaining 16 patients were later supervised at home, after satisfactory adjustments had been made. In some cases a foster home was considered more desirable than the patient's own home for other than medical reasons—usually because of an unfavorable environment, somewhat less often because of a lack of understanding and co-operation on the part of parents, and occasion-

ally because of intercurrent illness in other members of the family.

In contrast to the children having foster-home care, there were 28 patients, 52 per cent of the active group, whose entire convalescence was supervised at home. For 14 of these, approximately four weeks of hospitalization were necessary at the onset prior to transfer home. Family physicians were available and participated in the management in 10 cases.

RESULTS

The duration of recognized rheumatic activity in this group of 54 children averaged eight months for each patient. In one case two and a half years elapsed before the infection was considered quiescent, and two other patients required a full two years of bedcare. It is of some interest to compare the duration of the disease in this group with the average period of hospitalization of a similar age group with the same disease at the House of the Good Samaritan in Boston.* At this institution the average stay for each patient during 1939 was six months. It must be remembered, however, that the latter group had received previous bedcare in general hospitals or elsewhere prior to admission to that institution, where the waiting list is often long and a considerable delay inevitable. It is a reasonable assumption that the actual duration of rheumatic activity in the two groups was not significantly different.

More important than the total duration of rheumatic activity is the relative severity of the patient's attack, since it is this feature of the disease that largely determines the mortality, as well as the degree of disability in those who survive. An arbitrary division of rheumatic activity into severe, moderate and mild has been helpful in studying the disease in other groups. By the same criteria, 17 (one third) of the 54 patients of the present group had severe rheumatic fever; in 26 (one half) the rheumatic fever was moderately severe; and in the remaining 11 (one fifth) it was mild. No case of pure chorea occurred in the study group. This distribution is a fair index of the relative severity of the disease in this section of the country.

In appraising further details of the clinical course of the group, it has again been helpful to have for comparison a considerably larger group at the House of the Good Samaritan during the same five-year period. A summary of the more important findings in these two groups is shown in Table 1. Certain striking differences in the outcome

Seventy-ninth Annual Report of the House of the Good Samaritan For the year ending December 31, 1939. 35 pp. Boston: House of the Good Samaritan, 1940.

as reflected in this table require special comment, since they are not, as at first glance one might suspect, due to the type of care provided, but rather to fundamental differences inherent in the two groups, evident perhaps only to those intimately familiar with both.

As indicated in Table 1, there were at the House of the Good Samaritan from 1934 through 1939 a total of 615 patients of essentially the same age as that of the patients in the five-year study, who also received protracted bedcare and even closer medical supervision. In the smaller group, 39 (72 per cent) developed rheumatic heart disease; the remaining 15 (28 per cent) showed no signs of car-

TABLE 1. *A Comparison of Cases of Rheumatic Fever in the Present Study Group and the Group at the House of the Good Samaritan from 1934 to 1939.*

GROUP	NO OF CASES	POTENTIAL RHEUMATIC HEART DISEASE	RHEUMATIC HEART DISEASE	DEATHS
Present study	54	15 (28%)	39 (72%)	6 (15%)*
Good Samaritan	615	228 (37%)	387 (63%)	119 (30%)*

*Of those with rheumatic heart disease.

diac involvement. This compares with 387 (63 per cent) of the larger group who developed obvious rheumatic heart disease, and 228 (37 per cent) who remained in the potential rheumatic-heart-disease class. In interpreting the above comparison, it must be remembered that the latter figures are weighted in a favorable direction by a considerable number of patients with simple chorea, which is somewhat less likely to damage the heart than rheumatic fever.

A comparison of the mortality figures for the two groups reveals that in the smaller series 6 died as a result of congestive failure, all necessarily from the heart-disease group of 39, thus giving a mortality of 15 per cent. From the larger series of 387 with heart disease, 119 died, giving a mortality of 30 per cent, or twice as high as that in the smaller series. This striking difference in mortality appears significant, as, in fact, it is. The explanation, however, is obvious and is not related to differences in the type of care provided for the two groups. The series at the House of the Good Samaritan included a greater number of much sicker patients with a relatively poor prognosis, especially those with congestive heart failure, which were early recognized at the Massachusetts General Hospital as unsuited (except in special cases) for management either in their own homes or in foster homes. This very fact frequently accounted for their presence at the House of the Good Samaritan.

DISCUSSION

In view of the necessarily limited number of cases and certain evident differences peculiar to

the two groups, it is unlikely that a more detailed comparison would be significant. In fact, the results of such a detailed comparison, as already indicated, might be misleading. On the other hand, in attempting to evaluate this experience with the various types of care as provided in this community for children with rheumatic fever, the present method as it has developed over a period of years has proved adequate for the majority of cases. The results of this special study indicate that approximately 20 per cent, which includes the severe cases, ideally require institutional care for many months, both because of the more expert nursing care available and because of the necessary daily medical supervision. The presence of pericarditis, of pneumonitis or of congestive heart failure indicates in general a serious form of rheumatic fever in childhood, for which institutional management is indicated. For the remaining 80 per cent, foster-home care or supervised care in the patient's own home seems adequate. Either of the latter has, however, obvious disadvantages for careful clinical and laboratory study of the disease, but on the other hand, probably offers less exposure to respiratory infections, and hence fewer recrudescences of rheumatic activity, than care in a large institution. In many cases the small, well-run foster home is even better than the patient's own home. This is especially true if the units are very small and visitors infrequent.

When one attempts to appraise the relative cost of the different types of bedcare, certain obvious difficulties arise. The expense, in terms of patients a day, of maintaining a large general hospital, or even a smaller special institution, in contrast to a foster home, is necessarily high. In the present study and from data obtained from annual hospital reports, it appears that the daily cost of the three types of bedcare for a child with rheumatic fever in Boston is approximately as follows: Massachusetts General Hospital, \$7.50; House of the Good Samaritan, \$3.50; foster homes, \$1.90. The expense involved in the patient's own home is largely indeterminate and necessarily variable, but the economic advantage of the last is evident from the above figures.

In the present report and in the two that follow we have presented our experience to date with one method in the management of children with rheumatic fever. We believe that when both are available, a compromise between institutional care in some cases and foster-home or home care in others will prove in the end most effective, as well as economically sound. It is our belief that special institutions are needed in larger communities for the care of the sicker group and to serve as important centers for the study of the disease. At pres-

ent there is no convincing evidence that one type of management, in contrast to other methods, will influence differently the natural course of this disease, if certain minimal requirements are met. These requirements should include, in addition to adequate bedcare, a studied approach to each patient and his family, supervised recreation and education during convalescence, all possible protection from respiratory infection during this period and, finally, medical supervision by physicians well acquainted with the persistent nature and recurrent proclivity of this chronic disease inaptly called "acute rheumatic fever."

SUMMARY

Special study during five years of home and foster-home care for children with rheumatic fever indicates that, when well organized, it is adequate for the majority. The sicker patients need prolonged institutional care.

There appears to be no significant difference in the duration and course of the disease in this home and foster-home group and in the group who received similar care in an institution.

The economic and social advantages of home and foster-home care are evident.

A MEDICAL-SOCIAL PROGRAM FOR THE CHILD WITH RHEUMATIC FEVER*

EDITH M. TERRY†

BOSTON

THE special program for cardiac children at the Massachusetts General Hospital was developed, in conjunction with the already established Social Service Department, soon after the Pediatric Service was initiated in 1911 with Dr. Fritz B. Talbot as chief. At that time Dr. Talbot‡ outlined the following as essential for the adequate care of the cardiac child: hospital care for the acutely ill child; supervision of subsequent bed-care at home; provision for amusement; convalescent homes; vocational guidance; and prolonged medical and social-service supervision.

Although the growth of the clinic during the last thirty years has necessitated changes and promoted new activities, the main features of Dr. Talbot's original recommendations have also served as the basis of these newer developments. The general problem presented by the clinic child with rheumatic fever and heart disease is, broadly speaking, threefold: these are medical and social care, adequate education and suitable recreation.

The following is an outline of the methods employed and the resources available to us in Boston:

MEDICAL AND SOCIAL ASPECTS

Hospitalization has been provided, when it seemed desirable, at the Massachusetts General Hospital, or at the House of the Good Samaritan, for patients during acute episodes of rheumatic fever.

Placement in medical foster homes has been arranged

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‡Talbot, F. B. *A Consideration of the Social Service Work of the Department of Diseases of Children in the Massachusetts General Hospital*. 2 pp. Privately printed, 1912.

by the Children's Mission to Children when the home situation has been found, after investigation by physician and social worker, to be detrimental to the patient's recovery.

Medical-social home care, a term that means joint supervision by physician and medical-social worker, is a service given at home to patients in bed who are unable to afford a private physician. Home visits, arranged by the social worker and made on a monthly or bimonthly basis, not only secure for the patient consistent medical care similar to that given by a family physician, but promote a better understanding on the part of the physician of the social implications involved in treatment, and make possible frequent conferences with the social worker.

Nursing care at home has been provided by visiting nurses, supported by the community. In addition to instructing the mother in bedside care, these nurses have supervised the making of temperature and pulse charts and the following of the diet recommended by the physician. They have also kept the physician and social worker in touch with new developments as well as the general progress of the patient.

Medical-social case work has been considered the fundamental function of the social worker since the establishment of the clinic, and has included a study of each new patient and the use of available resources for each. Such studies are reviewed from time to time to keep in the foreground the individual approach.

Consistent follow-up of the whole group has been carried on by the clinic social worker. In addition to routine postcards, letters and home visits on patients who have failed to report when requested to do so, this service has included arrangements for clinic appointments, and laboratory service as needed. One hundred per cent follow-up is the aim of this service, and during 1939, on a group of 263 patients who had been at the House of the Good Samaritan, we were able to report on all but 1. At each clinic visit a brief interim history of medical and social

conditions has been taken by the social worker in accordance with clinic procedure.

EDUCATIONAL AIDS

Co-operation of home teachers has been secured through the public school system. By means of a home teaching service, when the acute phase of rheumatic fever is over children in this group have been able, in the majority of cases, to make their grades and on their return to school go on with their classmates. Failure to go on with one's classmates presents one of the greatest problems the cardiac child has to face, and one that the adolescent child is often unable to accept.

Tutoring by college students Repeated respiratory infections, with consequent days in bed, often interrupt the school program. Frequently children find that they are facing failure in one or more subjects because of such interruption. To prevent such disaster, we have been able with the approval of the schools, to provide for some of the children in this group tutors from nearby colleges who, by individual instruction, have made it possible for the child to surmount such difficulties.

Cardiac Summer School For the last few years, in co-operation with the Radcliffe College Appointment Bureau we have held during six weeks of the summer a school for cardiac children that has supplemented the work of the home teachers and the tutors. This school, held on the college grounds six hours a day and four days a week and carried along on progressive lines, has not only helped children educationally, but has provided suitable recreation for a group who are not at the time physically equipped to fit into ordinary camp life.

The school is carried on under the direction of a teacher in the public school system, the cardiac occupational therapist and tutors provided by the college. In addition to the usual grade subjects, opportunity for individual expression is given through various group activities. The summer school program also includes a hot lunch at noon planned by the hospital dietitian, and an hour's rest period out of doors.

School nurses Problems of patients returning to public school have been met through the close co-operation of the school nurses, who have made adjustments regarding elimination of stair climbing, restriction regarding school activities such as gymnasium and sports, noon rest periods, lunches and dental care.

The *Mothers' Club*, group activity for the enlightenment and education of mothers undergoing the anxiety of caring for children who are ill or otherwise handicapped, has an important place in cardiac rehabilitation. The club meets monthly. In addition to a brief talk on problems relative to the care of the cardiac child, opportunity is given during the tea hour for members to discuss among themselves their individual problems. The mother whose child is in bed goes back with new courage after hearing from others about their children back at school.

RECREATIONAL FACILITIES

The *In Bed Club*, with its membership of children facing like restrictions, its badge, its magazine to which the children contribute, and frequent contacts by mail and home visits, has tended to lessen the sense of isolation, especially for those in bed at home, so common to all children removed from an active group. In addition, it has been an aid in medical treatment by keeping the patients happy and contented during their convalescence. The *In Bed Club* has spread to include chapters in this country and abroad.

Occupational therapy has also played an important part in treatment, not alone for the patient, but indirectly for the family as well. Gay colors, interesting crafts, the ability to give as well as to receive, and best of all, occupation for otherwise dreary hours, not only help to keep up both the patient's and the family's morale, but have therapeutic value. This therapy has also helped to guide patients along lines of possible later vocational adjustment through study and development of their interests and abilities.

This program had been operating at the Massachusetts General Hospital for a period of years before the joint study with the Children's Mission began. Although it was considered reasonably successful, it was recognized that there was a need for greater unity and continuity of the various services, of more careful work with a smaller selected group of patients, and of evaluation of needs and services from the point of view of both the individual cardiac child and the total community program. To carry out these purposes, the hospital and child placing agency evolved a joint project that would make use of all existing resources of the previous program but would enlarge the opportunities for service.

As a means toward this end a working team was appointed and acting under the direction of a steering committee representing the co-operating organizations, was empowered to carry on the demonstration for a period of five years. This group consisted of a physician in charge of the medical aspects, a medical social worker from the clinic, a social worker,* who was added to the staff of the child placing agency, and an occupational therapist.

For this five year study 64 children under eighteen years of age were selected from the Children's Cardiac Service. Their residences were as follows: 31 from Boston, 12 from the metropolitan area outside Boston; and 21 beyond this area. There were 33 boys and 31 girls. The nationalities represented are indicated by the parentage: Italian 25, American 21, Irish 6; Russian (Jewish) 5; Canadian 5; Portuguese 1; and Greek 1. The religious affiliations were: Roman Catholic 48, Protestant 10, Hebrew 5, and Greek Orthodox 1.

Unusually consistent medical care and periodic evaluation have been possible for this group through the services of the physician in charge, who has known all the patients individually and who, by frequent conferences with the social workers, has kept in touch with the social as well as the medical aspects of each patient's situation.

The two social workers agreed on certain functions that each was to perform in the project. The

*During the earlier part of the project it was a children's worker in the latter a worker trained in medical social work.

medical-social worker in the clinic assisted the physician in the selection of children suitable for this project out of the total group of ward and clinic patients. Selection was largely limited to those whose prognosis, both medical and social, was sufficiently favorable to justify the expenditure of the time and money.

A further role of the clinic worker was to act as liaison between physician, child-placing agency and hospital. Her third responsibility was to follow those patients when they no longer required service from the child-placing agency, either because they had made a satisfactory recovery, from both the medical and social standpoints, or because they were not responsive to social treatment.

The special worker assigned from the child-placing agency conducted a careful study of all cases accepted. She also made a special effort to understand the emotional reactions of these patients and their parents to the disease. Through frequent interpretation and a close and continuous relation, she alleviated anxiety and helped them toward an acceptance of chronic illness without

undue emotional tension. She also aided with other personal adjustments that customarily come within the social worker's field.

From the social worker's point of view concerning this joint study, in which the medical and social analysis and treatment of the child have been carefully and thoughtfully correlated, lessons have been learned and valuable material gathered concerning the social, economic and educational aspects of the problem of cardiac children. One phase of the service, which has previously been given less attention than seems to us necessary, is the meaning of heart disease to the child himself—this will be considered in the following paper.

SUMMARY

The manifold experience of the Children's Cardiac Clinic of the Massachusetts General Hospital in meeting the social, educational and recreational problems of patients with rheumatic fever and rheumatic heart disease has been presented in summary form.

SOCIAL SERVICES TO CHILDREN WITH RHEUMATIC FEVER*

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THE two major interests of this co-operative five-year study have been to ascertain a rounded picture of the varied needs of the rheumatic-fever patient, and to investigate how these needs may best be met through community services. Special attention has been paid to the individual difficulties due to illness and common to this group of patients.

Care in the hospital for the acute episode had been the experience of most of our patients, the average stay being approximately four weeks. Social study begun in the hospital was completed by the children's agency worker, and the final plan for care was decided on jointly. The doctor described in the referral the type of care needed for the individual patient, and the medical-social worker attached to the children's agency investigated available possibilities to help in the decision of where that care might best be provided. Thus choice of aftercare depended on the individual situation, as well as on the physical need. Factors influencing the direction of care were often complex, and the original study of the situation was helpful in avoiding later pitfalls.

Aftercare was provided either in the patient's own home with close guidance of the children's agency worker to ensure careful following of the doctor's recommendations, or in medical foster homes, which will be described and discussed later. A well-integrated medical service was available for the patient by the same supervising physician of the hospital staff, whether the child was in his own home or in the medical foster home. The co-operation between the physician, the hospital social worker and the children's agency worker represented a closely knit, continuous service to the patient throughout the illness. During quiescence of the infection, consistent periodic follow-up in the clinic served to keep the patient co-operative and aware of his part in preventing recurrence. The continuity of medical supervision ensured a high quality of care, and resulted in the greater satisfaction and confidence of the patient. The personnel aiding the physician and the numerous and invaluable contributions by various community services have been described in the preceding paper.

CARE IN THE CHILD'S OWN HOME

The aim with the study group of children was to keep them in their own homes, since it was thought

*From the Children's Mission to Children.

†Medical-social worker, Children's Mission to Children.

that care for an extended illness in the child's own home, when feasible, has many advantages. Thirty-eight of the 54 cases continuing in our care were followed at home.

In general, the child is most content in his natural, family surroundings. Anyone who has watched closely the reaction of children removed from their own homes knows the psychic trauma such an experience often entails. Parental love and family surroundings offer to the child the only security in a world as yet untried. It is sometimes a big request to ask him to be content with care by strangers. Some children, after placement has been explained and described to them and after they have been given a chance to participate in the planning, will bravely and calmly try this new experience—many of them, of course, finding compensatory pleasures and interests in the new home. Other children, for reasons of their own,—and they are usually good ones,—cannot calmly accept this separation, as shown in the following case:

Billy chose an unfortunate time to be born. His father had lost his job for the first time one month previously. His 10-year-old sister was at the time critically ill with rheumatic fever. The family had recently moved to a house in a far-outlying district. Electricity and convenient transportation, to which the family had been accustomed, had not yet penetrated the new section. There were many hardships in rebuilding and making a home. Billy's birth was difficult, and the mother's memories of the event so painful that she planned that he would be the last. Through various interacting causes, Billy assumed the position of the most troublesome of the four children until, when he fell ill with rheumatic fever and chorea at 8 years of age, his mother was only too glad to urge placement for him. Although he objected, he was placed because of the inaccessibility of the rural home to services for the ill child. As he began to get better, his energy went into an increasing vent of behavior problems, and on discharge he worked out a surprising amount of aggression against his family. He taunted his mother with the accusation that she did not want him at home anyway, and asked why she had brought him back. Placement was certainly not responsible for the sudden development of a highly aggressive personality, but one needed to understand a little more of this child's status in the family—a youngest, most insecure child—to prevent placement from augmenting already existing problems. His feeling of not being wanted was accentuated by placement.

Another gain of home management is that, under the friendly interest and guidance of the doctor and social worker, the family and the patient learn to care for all stages of the illness, and to plan a good health program to prevent recurrences. Thus an obvious advantage is that the family and the patient learn together how best to care for chronic disease. There is an opportunity, then, for the family to develop a feeling of adequacy in handling its own situation, rather than acquiring a feel-

ing of frustration, which may result from relieving the family of desired responsibilities, or the equally harmful overdependence of the family on outside persons to take over the care of the sick member.

A further advantage in keeping the child at home during prolonged bedrest is that he does not suffer a loss of place in the family group. Some children return after extended medical placements virtual strangers to baby brothers or sisters who have grown and have actually forgotten the patient. Older brothers and sisters are shy and reserved with the newly returned child. It is not that irreparable damage has been done,—children soon find their old footing in common interests,—but the patient's sense of isolation and difference from the group of normal companions is called to conscious recognition by these painful experiences. This is illustrated by the following case:

A 15-year-old Italian girl refused placement from the hospital in a nursing home for the third time. Unalterable overcrowded conditions existed in her own home, because of the multitudinous and merry family group of nine living on a marginal income. Since she had missed the birth of the last baby, she wanted to be on hand for the next one. She remarked woefully to the worker: "People are always planning visits to meet me at home, and by the time they get there I'm either in the hospital or the foster home. They know me by description, I'm the sick one. But they never see me. I'm just a make-believe Stella." She was followed medically at home. Her physical condition to date (now two years later) has been unusually good, despite the crowded home conditions.

The social worker's most active period of service to the family during the patient's home care is in the early stages of the illness, when parents are eager to learn what constitutes good care, and when a schedule conducive to recovery can be worked out with them. Questions are many, since misunderstandings, doubts and fears of both the patient and the family give way in many cases under simple, truthful interpretations of the disease to understanding and a calmer, rational acceptance of the illness as inconveniencing and difficult in some ways, but within the range of comfortable adjustment.

Help in planning for the patient's care at home includes introducing the services of the visiting nurse, the results of whose consistent watchfulness of physical findings are recorded for the physician. Accessory services of the nurse include suggestions regarding the patient's diet and practical ways of making the patient more comfortable. These, in addition to her professional skill and friendly interest, are valuable aids to the family. The visiting teacher brings the needed antidote for frequent worries over school retardation. Worries that are not founded on previously existing school difficulties vanish with progress in lessons. All but 2 of the

54 children had home teachers provided through the public-school system. Six had the additional help of volunteer tutors, and 17 attended the summer school organized by the Cardiac Clinic. The occupational therapist on the staff of the Children's Mission brings the patient vital and interesting substitute activities to offset the sense of isolation and restriction. The studious or creative patient can be encouraged to make the most of this enforced period of leisure in learning new skills, such as modeling, weaving or wood carving. Vocational interests in some cases are found, or suggestions of a change of interest more in keeping with the patient's handicap subtly encouraged. The occupational therapist often finds her program demanded by healthy members of the family, who feel left out of fascinating and worthwhile handicrafts. The patient, instead of losing his particular place in the sun, has gained a new prestige. The occupational-therapy program, by creating a happy atmosphere of activity, geared to the child's physical capacity, helps to prevent excessive self-interest.

Plans for the patient's care at home may include material aid for the added stresses of illness among families of marginal income. Twenty-two families in the study had adequate incomes and physical resources for care. Thirty-two families had borderline or inadequate incomes. For the latter, if they desired the service, budgets were worked out on the basis of Community Health Association estimates of the total needs of a family according to size. Financial aid was frequently secured from the proper agency to ensure adequate food and living quarters.

While these long-time adjustments are being arranged, the extra expenses of illness, which a family is unable to meet, are provided by the children's agency. Much unhappiness and sense of failure, which can be oppressively acute, is avoided for those parents whose intelligence and capable management make them adequate to meet the demands of the illness, but whose pay check for one complicating reason or another fails to cover the requirements of their families. Expressions of gratitude from parents who were helped to provide adequate care at home, have made clear the earlier feelings of many — the unhappy resignation of being unable to provide essentials for a child, particularly a sick child, and a feeling that once more inadequate resources would force them to fail as parents. These general case-work services can help with environmental changes, thus easing necessary long-time bedcare, such as a move permitting more convenient accommodations for the patient's care. Many and varied are the needs during illness in the lower-income groups.

The types of families that can be depended on to provide proper care for the patient are for the most part easily distinguished in those first weeks of frequent visiting. One group of parents is represented by those whose questions and problems are natural in the face of meeting a new situation, and are alleviated through developing capacity to carry out medical recommendations. With the initial discouragement at prolonged illness somewhat abated, many mothers show creative imagination in handling the more complex and newly developed behavior often associated with illness, becoming interested in discussions with the social worker, and consciously offsetting undesirable family attitudes or actions.

There are two groups of parents whose cooperation is not so dependable. One is the group in which marked emotional instability exists. By marked instability I mean those homes where interest in the patient and in the good of the family as a whole does not come before a parent's preoccupation with personal dissatisfactions. Within a short time it is possible to evaluate the parent whose efficiency is impaired and who will hamper the patient's progress by neurotic attitudes. Patients from these families are best placed in foster homes, where a strong sense of responsibility for their own health care may be developed, since it is likely that parents disturbed by personal difficulties cannot offer sane guidance through ensuing years. Another group of children who seem to fare better for a period of recovery in the foster homes are those from homes where parents are simple and childlike, because of limited experience and background resulting in an inability to recognize or to handle the usual parental responsibilities.

The complicating problems of some parents may be open to a degree of change or relief through services offered by the medical-social worker. Psychiatric services can be used for others. To minimize as much as possible the effect on the patient, one may have to continue with those parents whose problems affecting the patient's adjustment and care are not open to relief through either of these channels.

During illness, the greatest development of the family's potential strength comes through the vital interest of the worker in the patient, and in the family's progress toward confidence and competence in handling the situation itself. This source of strength to the family is second only to faith in the physician and the security of adequate medical care.

CARE IN MEDICAL FOSTER HOMES

Medical foster homes have been used when uncontrollable situations existed in the patient's own

home, or consciously as an aid in educating the patient and the family in the recommended long-time care for this chronic illness. Twenty-six children were placed in foster homes once during the five years; 13, twice; and 1, thrice. The length of time spent in the foster home ranged from one to sixteen months.

The foster homes used are private homes in residential districts. They accommodate from 4 to 15 children in each, and are run by trained nurses under medical supervision. Initial investigation of the prospective home is made by the home finder of the Children's Mission, and periodic evaluation of the home is made on the basis of experience in working with the foster mother, so that a high standard is maintained. The foster mothers and their assistants are usually motherly persons, who prefer to maintain a comfortable and attractive nursing home to doing private or institutional duty. Needless to say, they like children and have some insight into the sick child's problems, as well as an ability to learn daily how best to handle the behavior components of illness, induced by resentment, discouragement, fear and other emotional attitudes. The social worker's job here is to further the foster mother's understanding of the child, and to help the patient with his difficulties. The foster homes are under the administration of the children's agency, which has the responsibility of approving and supervising them as well as paying for the service of the foster mother.

Proper health routine within the medical homes is well established, and becomes a habit with the children. There are usually three to four children in a room, depending on its size. Adequate air, light and space between the patients' beds are provided. The rooms are gay, colorful and comfortable. Space for the immediate isolation of respiratory infections is reserved in each home. Foster-home care for ill children has been a natural development to meet the recognized need for congenial, homelike surroundings for their best growth, physically, emotionally and intellectually.¹

A contribution of the foster home to the child's physical comfort and progress is the purposeful, gradual education of the patient to assume responsibility for the proper health care within his own home. If the child is a responsible and praiseworthy partner in his own health program, the resentment and consequent rebellion, which so often impede physical progress, are offset.

DISCUSSION

Whether in his own home, or the foster home, helping the child to establish a program correlated with the long-time needs created by chronic illness, continues to be the social worker's respon-

sibility after recovery from active infection. The worker attempts to establish on her own work sheet, as it were, a clear idea of environmental influences on the patient's illness, based on factual material, observed actions and expressed attitudes, so that she may offer constructive guidance toward adjustment to the disease. Medical-social workers are agreed that their most important activity, because it is the fundamental understanding on which the specific services can be geared to meet the child's need, is the long intricate process of knowing well the patient himself in relation to his family and associates. Individualization, or an attempted understanding of what kind of person one is serving, is a basic social-work concept.²

One must daily face the practical necessity of knowing family attitudes and relations for a correct evaluation of the patient's attitude toward the illness. The child's reaction to disease is frequently a reflection of emotional attitudes for which the groundwork is already laid. It is important that these attitudes should not be more crippling than the degree of heart disease suffered. Any chronic illness frequently constitutes a focus of attention and can result in an accentuation or progressive development of a number of character traits, including dependence on others or an incapacitating fear of illness. One must understand how and why the patient is responding to disease, if one hopes to prevent or to lessen varying degrees of maladjustment in those children whose life experience tends to set the stage for unwholesome or exaggerated attitudes toward illness. If one is able to make the most of this opportunity, an early diagnosis of the social component of illness will result in a plan of treatment that is a vital, growing process.

An example of a social diagnostic statement made three weeks after a case had been accepted shows how the interrelated factual material—growing clearer, as time goes on—sets the trend of treatment from the earliest planning for the patient. It is recognized that human material of this sort is not subject to criteria of absolute definiteness as certain types of medical diagnoses are, but rather that one is dealing with feelings, attitudes, actions and influences subject to constant flux and change. The social diagnostic statement is a useful, flexible and, in large part, valid guiding post for action by the social worker in helping the patient to make his best adjustment to chronic illness. This early social diagnostic statement, although still lacking essential knowledge of the patient, is a beginning and permits constructive handling of individual reactions to rheumatic fever, as shown by the following case:

A 14-year-old, Roman Catholic boy of Irish parentage, in his first year in high school, was the oldest of three children. Finances were adequate, covering the essential needs for the family. The father had lost his status in the white-collar merchant class because of the depression, but had held a responsible laboring job consistently since that time. The family lived in its own house, maintaining excellent standards of care and household routine.

The patient had a severe attack of rheumatic fever, and was uncertain and confused about his illness. Placement was asked by the mother, because the boy refused to recognize the need of medical restrictions and the mother feared that she could not control him at home. His greatest interest was in sports, in which he had taken an active part, and in which he had entertained the idea of a life career. The patient showed anxiety and great interest in what rheumatic fever would mean to his future program. He had bet contemporaries on the ward a dime that, contrary to their explanations, rheumatic fever had no possible connection with heart trouble.

Coupled with the patient's refusal to accept illness was disappointment over possible school failure because of absence. This feeling was accentuated by the family's tendency to stress schoolwork with the patient more than with the other children, because he was a borderline student. There was indication in the school record that his capacity was average, or above.

Another social component of the patient's illness was worry over the results of his sickness on the family's economic security. There was evidence of further disturbance on the patient's part, because of conflict with his mother. Her "old-fashioned" standards and management were opposed to the patient's ideas, which were based on practices of his schoolmates. Evidence of the patient's complaints was found in the mother's oversolicitous supervision of the boy's hospital experience, as well as the fact that the only point of dissension between the patient's parents was the mother's discipline of him. It seemed that the patient's dissatisfactions with his mother's discipline had a legitimate basis.

Treatment plans for this patient included efforts to modify these factors, as well as to provide for immediate practical needs.

Our aim,³ then, is to promote the patient's adherence to the medical program by helping him

to understand and to work through his own specific problems in relation to illness and to facilitate a realistic acceptance of heart disease and possible chronic illness, so that he may pursue, to a reasonable degree, vocational interests and social satisfactions in spite of a limitation of activity.

SUMMARY AND CONCLUSIONS

The social service offered within the patient's own home, permitting the recovery program for rheumatic fever to be carried on there, is described. The major advantages of care in the child's own home are considered to be the patient's greater contentment, in most cases, and the development, through education and encouragement, of the family's and the patient's confidence and competence in handling the problems of chronic illness. Home care is considered unsuitable mainly when parents are markedly neurotic, or childlike and undisciplined.

Medical foster homes have been developed to offer homelike and wholesome surroundings for the ill child. They are used especially for the definite educational purpose of training the child to assume responsibility for his own health care, thus tending to prevent recurrence of active rheumatic fever. Foster-home placement is indicated not only for training the patient in a health program but also when unalterable conditions not conducive to recovery exist in the child's own home.

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REFERENCES

1. Chapin, H. D. Convalescent care in foster homes. *White House Conference on Child Health and Protection, 1930.* 279 pp. New York: Century Co., 1930. Pp. 92-98.
Sub-committee report of convalescent care in institutions and foster homes. *Ibid.* Pp. 170-180.
2. Ebert, V. B. Services to rheumatic children. *The Family* 22:14, 1941.
3. Report of subcommittee on medical social service. *White House Conference on Child Health and Protection, 1930.* Pp. 142-154.

PSEUDOCYESIS*

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PSEUDOCYESIS, or spurious pregnancy, has been an affliction of queen and commoner with reverberations in many fields from domestic to theological.

Good, in his *System of Nosology* (1823), first coined the term from *pseudes*, false, and *kyesis*, pregnancy. Writers from Hippocrates to the contemporaries have lavished on the syndrome descriptive adjectives that vary from "brain pregnancy" to "wind in the bowels." Today it is defined as a condition in which the signs and symptoms of pregnancy appear or are simulated in whole or in part. The clinical picture may be so exact as to deceive both patient and physician. One may add that this affliction is usually regarded as purposive on the part of the patient.

HISTORICAL ASPECTS

Bivin and Klinger¹ in their classic monograph on the subject have provided an excellent historical background. Hippocrates² encountered twelve such patients in his practice in 300 B.C. As interest continued, there was considerable speculation as to the etiology. Each man proposed his views according to the medical knowledge of his day, although many writers were not concerned with its cause. Hippocrates² wrote:

When the matrices taking in the air coming from the stomach which supplies it, swell, and the women believe themselves pregnant, or else, if the menses not flowing, accumulate in the matrices and stay suppressed for some time, there is continual flux in the matrices, sometimes with air coming from the stomach, some times from the effect of heat, and then again women imagine they are pregnant, seeing that the menses are suppressed and the matrices swollen.

William Harvey³ suggested that both the brain and the uterus were filled with an "imagination (phantasma)" brought about by coitus or a conception without result.

Mauriceau⁴ (1721) speaks of a "false great belly" engendered by nothing but wind mixed with waters. "This false great belly . . . is often caused by wind which blows up and distends the womb and which women often times discharge with as much noise as if it came from the fundament. Sometimes it is nothing but water gathered there in such abundance, as some have been seen to void a pail-

full without any child, though they verily believed they were with child." Girard⁵ (1801), of Lyon, thought "the impulse given to the uterus by coitus sufficed to give birth to signs of false pregnancy, although the sperm had not been absorbed by this organ. The seminal fluid gives life particularly to the uterus which reacts on all the system as if she had something in this cavity."

Schmitt⁶ (1857) was the first to consider the subject on a hysterical basis, as being due to the effect of an excited imagination.

It is as if impregnation proceeded from the brain, a matter which can only be comprehended, and that obscurely, from the intimate polar conception (sympathy) known to exist between the cerebral and sexual systems, together with a degradation (depression) of the cerebral into the depths of the ganglionic system, together with a magnetic effort on the part of the latter to break through the limits of individuality (or those allotted to it).

The majority of writers believed that this was not self-deception, and not entirely a product of the imagination, for it is a phenomenon repeatedly observed in animals—creatures reputedly without imagination.

Underhill⁷ (1877) looked on pseudocyesis as a mental aberration and but one of a number of symptoms of such imbalance:

The delusion in all these cases is a false interpretation of bodily sensations occurring for the most part in the abdominal viscera. Air moving about in the bowels, whether giving rise to tympanitis or not, is the most frequent source of sensation which the disordered brain falsely recognizes as movements of the child. Or . . . simply the twitchings of the abdominal muscles may be mistaken for the sensation of quickening, the disordered mental faculties being unable to appreciate the difference. . . . Simple distention of the abdomen, whether from intestinal gases or graver causes, may also give rise to a false belief in the existence of utero-gestation.

Meigs in his *Diseases of Women* (1879) easily disposes of one school of physiologic thought: "It is against physiology, against pathology, and it flies in the face of common sense, to talk of a collection of wind distending a material like the womb. Air is too subtle to remain quietly locked in a bottle that has no cork in it."

Gradually the pendulum overbalanced to the "mechanism of neurosis" wherein guilty serving girls and guilty wives built up case after case

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This passed the extreme phase soon, however, and Charcot (Bouchacourt,⁸ 1892) said, "Hysterical, no; mental, yes." Maryanchik⁹ (1894) indicted the obesity of the rich as well as the flatulence of the poor. Mitchell¹⁰ (1895) wrote, "Women suffering from pseudocyesis are in no sense of unsound mind, nor is their illusion to be classified with the delusory and obstinate belief as to their pregnancy held by some of the insane." Of the childless woman at the climacteric, he wrote, "The illusion of pregnancy in such females is a flattering one."

Donald¹¹ (1897), of London, divided phantom tumors into five classifications: those associated with pelvic peritonitis, the normal climacteric period, a pathologic menopause, amenorrhea and a rapid development of fat in young women as a symptom of pure hysteria. Janet,¹² Lemesle¹³ and Le Menant¹⁴ all emphasized the correlation with hysteria and neuroses. Pohl¹⁵ (1901) believed that knowledge of the symptoms of pregnancy was essential in the development of the entity. Berkeley¹⁶ (1922) explained the mechanics of the abdominal distention thus:

Diaphragmatic contraction, pressing down upon the abdominal contents and making them bulge. . . . It might be supposed that this diaphragmatic spasm is really voluntary, but there is no doubt it is not entirely so. No person could voluntarily keep up such a muscular effort as is required to produce the enormous swelling seen. It is strictly a condition in the same category as hysterical fixation of a joint.

Haultain¹⁷ (1926) gives the cause as "reflex nervous" from mental perversions met with in sterile women at menopause, in women newly married who are desirous of offspring, and in the unmarried women who have had illicit intercourse; other "reflex nervous" causes are from diseases of the generative organs, such as fibroids, ovarian cysts and ascites. Williams¹⁸ (1924) wrote: "Occasionally women, usually at about the time of menopause, develop abdominal enlargement and, wishing for pregnancy, get a firm idea that this has occurred. The symptom complex of amenorrhea (due to menopause), enlarged abdomen (due to deposition of fat plus hysterical depression of the diaphragm), sensation of fetal movements (consciousness of intestinal movements), and so forth, can easily delude a woman."

In 1814 Joanna Southcott, a sixty-four-year-old virgin prophetess, announced herself with child by the Holy Spirit. Gooch¹⁹ (1859) quotes her physician, Dr. Reece, as writing, "When these symptoms [enlargement of the breasts and abdomen] were accompanied by a sensible motion of the womb, I could never hesitate in pronouncing it a case of pregnancy, and this was actually my opinion of her situation." Eminent opinion was di-

vided. Her followers, some hundred thousand, awaited their new Messiah joyously. Two months after the date set for her confinement, Joanna died. An autopsy was performed in the presence of fifteen physicians, and there was no trace of the tumor that Joanna had felt during her life.

A number of interesting stories are told—one of a young man who was forcibly married by his bride's brothers. The young man's rage was reported as "boundless" at discovering that he had been compelled to marry her on a false supposition. Poetic justice was dealt a number of "seducers" in the past according to tellers of the obviously enjoyed cases.

Many writers suggest that the final factor of the symptom-complex is a physician who mistakenly confirms the patient's hopes, fears, or suspicions!

ETIOLOGY

Each writer on the subject has contributed a somewhat different explanation. The older writers lean toward physiologic explanations, whereas the more recent point out the possible psychogenic basis.

Bivin and Klinger¹ (1937) have collected all the 425 cases appearing in the literature,—excluding mental and physical disease,—and have added 19 cases. Their study is complete, and their figures on these 444 cases are most interesting. The statistical review of their cases gives the youngest patient as seven years of age, the oldest as seventy-nine. The greatest incidence was found during the period of active reproductive power, an average age of thirty-three representing the midpoint of distribution. Sixty-five per cent were found between the ages of fifteen and forty; whereas in the menopausal group of from forty to fifty years, only 16.7 per cent were found, contrary to the usual belief. Eighty-three per cent were married; 14.6 per cent were unmarried; 2.3 per cent were widowed. The condition was most frequent in second marriages, particularly if the first had been a sterile union. Only 37 per cent had had previous pregnancies, and some of them had had many pregnancies. No particular race, creed or group was implicated. Included in the cases are the names of Mary Tudor, Queen of England, the wife of a French president, and a queen of Serbia. Only one case in a Negress was reported.

The more recent writers believe that this problem is more frequent in the emotionally unstable group. A few of Bivin and Klinger's cases went on to frank mental degeneration, but the majority were reasonably normal. The grim incredulity with which the true diagnosis is resisted is pointed

out as proof of an underlying psychogenic defect. The tenacity with which these patients go from doctor to doctor hoping for an encouraging diagnosis, the enthusiasm with which they prepare the *impedimenta* for their hopes, and the scorn in which they hold the luckless physician who pronounces the adverse opinion, are characteristic. Reports are given of three patients who persisted in their belief for eight, nine and eighteen years. However, the confidence of the large majority is shaken severely when the supposed gestation is prolonged over the tenth or eleventh month.

About 25 patients went through a normal pregnancy after having gone through a period of false pregnancy. Other cases in which interrupted pregnancies were continued as false pregnancies are noted. A few cases of multiple false pregnancies were reviewed; one patient had four, only to follow them with a fifth normal gestation. Several cases of pseudocyesis were overlooked because the examining physician could not exclude immediately an ectopic gestation. An embarrassing few have gone from a supposed pregnancy to a real one.

The main psychologic factors involved in these cases were desire, fear, hysteria, suggestion and autosuggestion. No one factor was present in all patients.

SYMPTOMS

It is now generally agreed that the patient need not have experienced a previous pregnancy for this diagnosis to be considered seriously. Only 37 per cent had had previous pregnancies in Bivin and Klinger's¹ series. The symptom-complex of pseudocyesis mimics in great detail true pregnancy.

In their review of the symptoms encountered in these cases, Bivin and Klinger found menstrual disturbance, particularly amenorrhea, the most frequently recorded symptom. This is statistically no more frequent than that in any age group. The amenorrhea, fatty deposition and constipation of menopause are an often-repeated triad. Emotion, menopause and endocrine disturbance are cited in explanation.

Enlargement of the abdomen was next in frequency, usually simulating that commonly associated with true pregnancy. The rate of enlargement often follows that of normal gestation. Flatus, constipation, fatty deposits in omentum or abdominal wall, a full bladder, retention of urine, diaphragmatic spasm. (hysterical) and muscular contraction, are given as possible explanations. Breast changes, including secretion, change in the size and character of areola, pigmentation and fullness, are noted. DeLee²⁰ pointed out that the breast signs have no significance in old multiparas,

since the breasts are enlarged and often contain milk for years. One investigator blandly explained that because milk was dried up by the stresses of some emotions, it would be logical to assume that other emotions could encourage production. The physician usually has no basis for comparison, but one patient, an artist, supplied her physician with hand-painted pictures of the changes of her breasts as reflected in her dressing mirror. Multiparity, pituitary dysfunction and menopause are offered as explanations for these phenomena.

Gastrointestinal symptoms, such as nausea, capricious appetite, constipation and vomiting, are common complaints. Fetal movements are of interest, for observers are impressed by the fact that those which the patients report are of unusual vigor, usually out of proportion to the supposed stage of gestation. Misinterpretation of normal somatic sensations ordinarily disregarded is the commonest explanation of such symptoms. Fetal heart sounds are reported rarely, a phenomenon probably due to abnormal transmission of a disordered maternal pulse. The duration of pseudocyesis in the great majority of cases is nine months, although some go ten or eleven months before suspicion is raised. Already cited have been three cases prolonged to eight, nine and eighteen years respectively.

DIAGNOSIS

Pajot²¹ states, "There are no false pregnancies, there are only false diagnoses." In 161 cases of Bivin and Klinger's series, one or more physicians were deceived by the signs or symptoms of their patients. Barnes²² counseled watchful waiting for a month to see if the issue cleared—either by frank progress of gestation or by subsidence of the symptoms. He referred the matter to "Time, the great solver of mysteries." Certainly there is no doubt that an incorrect diagnosis is a powerful factor in convincing an uncertain patient, and an equally potent one in disconcerting her medical attendant. Failure of the physician to produce concrete evidence in the ninth month removes this question from the medical field.

Some writers believe that it is difficult to differentiate true from false pregnancy. Caution in any patient whose story and physical findings are at variance will diminish the possibility of many unfortunate errors. The physiologic changes found in the breasts, cervix, vagina and uterus are never faithfully copied from pregnancy, but are only mild changes in that direction. One important sign is universally emphasized: the umbilicus is not the pouting one of gestation, but is the depressed umbilicus of the nongravid state. This,

combined with the alleged astonishing vigor of the fetal movements, should arouse suspicion.

The biologic tests of pregnancy are obviously of value in questionable cases. Roentgenography, if gestation has progressed sufficiently, is of aid, although confusion may arise from calcification within a fibroid, bowel contents, and so forth. Final resort is made usually to examination under anesthesia. Steady pressure under anesthesia will reduce the abdominal distention, with release of diaphragmatic spasm, and the passage of flatus. Occasionally, as the patient recovers from anesthesia, the distention recurs. Simpson in his *Diseases of Women* (1871) recounts the case of a Scottish peasant woman in her thirteenth month of pseudogestation. She refused to be convinced that she was not pregnant. Simpson put the woman under anesthesia and called her sister, who felt the spine through the collapsed abdominal wall. As the patient recovered, the distention reappeared, and she awakened to find no change in either her condition or her convictions. Her sister quieted her, "Hauld your tongue, woman, you've nothing in your wame for I felt your backbone myself with my ain hand."

TREATMENT

Whatever method has been devised to meet best the individual problems of the case is effective. Present-day methods are aimed at relieving by psychotherapy the patient's conviction that she is pregnant. Many women, however, will not countenance the diagnosis, seeking further medical advice, and usually leaving the first consultant without either fee or thanks. Bivin and Klinger¹ listed other methods, including informing the patient of her true state (56 cases), the use of anesthetics (50 cases), drugs such as morphine, opium, emmenagogues, and tonics (47 cases), purgatives (22 cases), hypnosis suggestion (19 cases), baths, curettage, operation, massage-pressure, catheterization, placement of uterus and psychotherapy.

CASE REPORTS

The following are the clinical histories of the 7 cases of pseudocyesis that occurred in the Boston Lying-in Hospital from 1927 to 1940. Search through the records of the Free Hospital for Women in Brookline, Massachusetts, failed to bring forth any additional cases. It is admittedly not a rare condition, although only 444 cases were reported by Bivin and Klinger from the time of Hippocrates until 1937. This infrequent recording of the disease may be due to lack of interest in the last three decades, to better methods of diagnosis

in pregnancy or to a subtle change in the feminine vapours.

CASE 1. M. C. (No. 38192), a 31-year-old para V, had had three miscarriages. One year before entry, a cesarean section was performed at another hospital, and a dead baby extracted. Previous catamenia had been regular each month, but were scanty, lasting 3 days, with some dysmenorrhea. The last flow had begun on January 9, 1927. The patient was first seen in the clinic on July 18 with an expected confinement date calculated for October 16. The symptoms included morning nausea with occasional vomiting, epigastric fullness and pain, dizziness and a "pregnant feeling inside." She had felt fetal movements in March, when she would have been about two months pregnant by dates. She had begun to flow a small amount just before entry, and was firmly convinced that she was aborting.

Physical examination was essentially negative. The breasts were small, and without secretion. The uterus could not be felt abdominally, and the abdomen was flat. The fetal heart was not audible. On vaginal examination, the cervix was firm, closed and lacerated. The fundus was posterior and of normal size. Vaults were clear. The flow was menstrual in type.

Treatment consisted of informing the patient that she was not pregnant, that she might have miscarried, and that this was a scanty period after amenorrhea for six months. This information was not well received. The patient did not again visit the clinic.

CASE 2. S. R. (No. 41331), a 41-year-old para III, had previously had two normal full-term deliveries, the last 11 years before entry. Both children had died within the first year of life. The last period began on February 13, 1928, and by dates, confinement was expected November 20. The patient first presented herself on November 26, believing herself to be beyond term, with bleeding. She had noted amenorrhea, nausea in the early months and abdominal swelling that progressed with gestation, and she was convinced of her pregnancy. In the fourth month she thought that she felt fetal movements. On November 19, she had slight painless bleeding of two days' duration. On November 24, she had indefinite abdominal pains, mostly about the umbilicus, which she interpreted as labor pains, and which brought her in to the clinic six days beyond her expected date of confinement. Physical examination of the breasts was negative. The abdomen was very obese, and a mass rising 26 cm. above the symphysis was noted, although it was poorly demarcated. The fetal heart was not heard. The patient seemed to be having mild labor pains. Because of the story of bleeding she was not immediately examined vaginally. X-ray examination revealed no fetal bones. Examination under anesthesia confirmed the diagnosis of pseudocyesis, because the findings were those of an atrophic uterus. She was informed of her nonpregnant state. "Labor" ended spontaneously. She did not revisit the clinic.

CASE 3. I. S. (No. 5625), a 44-year-old para V, had had four previous miscarriages at 3 to 4 months, the last occurring 1 year before entry. Catamenia were essentially normal until February 17, 1931, when she lost "two quarts of blood." She had no further flow until July 18. Over this period of amenorrhea, she noted abdominal enlargement, and was confident that she was pregnant, the expected date being November 24. On July 18, she had a little bright staining, fainted and was brought to the

clinic because she thought that she was aborting. Physical examination of the breasts was negative. No fetal heart was heard. No definite distention or mass was made out, although she had a large panniculus. On pelvic examination the uterus was small and anterior, with a closed, firm cervix. There was a slight thickening in the left vault. X-ray study and an Aschheim-Zondek test were negative. It was not difficult to convince her that the menopause was starting in.

CASE 4 F F (No 18229), a 27 year old para IV, had had three full term deliveries, the last two years before entry to the clinic. Her last period began on May 14 1937 and confinement was expected February 21, 1938. She had noted 5 month amenorrhea and progressive abdominal enlargement. In the 5th month she stained slightly and came to the clinic with a suspected miscarriage. Examination of the breasts was negative. Abdominal examination revealed the fundus at the height of a 5 months pregnancy. No fetal heart was audible. The patient was not examined vaginally for 6 days or until bleeding had stopped. At this time, the fundus was found to be only slightly enlarged, with a bluish, firm, hard cervix. The patient was observed for another month, with no change in the physical findings and with resumption of the normal menstrual cycle. Her conviction of pregnancy was considerably shaken by subsequent menstruation.

CASE 5 M D (No 3240), a 40 year-old para XIII, was first seen by the author in 1940, the patient was in bed at home, complaining of nausea, vomiting, lower abdominal cramps and bleeding, after amenorrhea of 7 months. She was convinced that she was 6 or 7 months pregnant. The breasts contained secretion, but the areolas were not typical of pregnancy. The abdomen was greatly scarred from three previous abdominal operations and palpation was difficult because of a large ventral hernia. One observer felt a diffuse mass rising to a height consistent with her presumptive confinement. No fetal heart was heard. On vaginal examination, the uterus was atrophic and fastened to one of the abdominal scars. The adnexa were normal. Bleeding was distinctly of menstrual character. When the author raised doubts as to pregnancy, the patient indignantly marshaled her family. She pointed to one child, saying, "That was a fibroid tumor at the — Hospital." Pointing to another, she said, "That was four negative A-Z tests at — Hospital." Indicating still another, she confounded the observer with, "That one was a negative A-Z test at your hospital!" Furthermore the patient volunteered that she had never felt fetal movements with any of her pregnancies, but only a wave, which had been present in this pregnancy, that she had never had any labor pains and that she had had regular cyclical menstruation throughout all her pregnancies. The difficulty of convincing her that she was not the victim of a similar medical plot on this occasion was indeed great. She was still not convinced, for she made subsequent visits to the hospital within a month after her flow stopped. There was no change in the physical findings.

On going into her history, however, it was found that none of the above statements could be verified, although in 1936 while she was under the care of a psychiatrist for treatment of a proved spurious pregnancy, she surreptitiously became pregnant and delivered about six months after the psychiatric cure had been effected. Study of hospital records of her previous prenatal courses and deliveries showed that she had had the usual amenorrhea of pregnancy, had felt fetal movement, and had delivered in pain despite her memories to the contrary. Her firm conviction

of pregnancy was perhaps a wisely tribute to her husband's powers.

CASE 6 A E (No 20910), a 29 year old para IV, entered the clinic on January 15, 1940, with a story that her last period had begun on November 13. She had felt swelling of the breasts and heaviness of the abdomen. The morning before entry she noted uterine cramps and flow commenced, facts which she believed to be due to a miscarriage, although no tissue was passed. Examination of nipples and breasts was negative. There was slight abdominal distention. The uterus was felt two fingerbreadths above the symphysis. She was treated for a threatened abortion for 1 week, when the bleeding stopped. It was thought that her flow might be menstrual. She again flowed on February 14, but this time without cramps.

She was followed in the clinic until April 29, at which time her gestation should have been at 5 months. The patient was firmly convinced of her pregnancy, had gained 7 pounds in weight, noted constant lower abdominal swelling, felt pregnant but had not observed fetal movements. Pelvic examination at this time showed a normal uterus, with no evidences of pregnancy. She persisted in her delusion, however, and was examined once again a month later to settle the matter. It may be that she did miscarry in the second month, but followed this with her spurious gestation.

CASE 7 H L (No 60739), a 26-year old para II, was first seen on May 11, 1940. This was in the seventh month of the patient's second marriage, and she desired a child very much. She had missed her February period, but had had flow each month thereafter, having just completed the period before her visit to the clinic. She had noted progressive abdominal enlargement, and her profile was that of a 5 month gestation. There had been a 20 pound gain in weight, swelling of the breasts, nausea, and vomiting usually at night. Both the patient and her husband had been greatly impressed with the vigor of the fetal movements when each nightly palpated the maternal belly.

Physical examination revealed nongravid areolas and breasts. There was no 5 month abdominal tumor. The umbilicus was depressed. The vaginal mucous membranes were not cyanotic. The uterus was firm and of normal size and consistence. Menstrual blood was issuing from the cervix.

She received the diagnosis of spurious pregnancy with contempt, and asked for laboratory confirmation. However, she consulted another physician, who concurred in the diagnosis. She ultimately capitulated.

SUMMARY

Pseudocyesis or spurious pregnancy is a clinical entity that has existed unchanged in its symptomatology since Hippocrates first described it. Explanations of etiology mirror the medical thought of each generation, from the old physiologic explanation of "wind in the womb" to the newer concept that places the syndrome on a psychogenic basis. The only additional aids to diagnosis have been the employment of roentgenography and of the biologic tests of pregnancy. Neither of these supersedes caution on the part of the physician in diagnosing pregnancy. Today's treatment is identical with that of our medical forebears, except that it is garnished with psychotherapy.

Seven cases are presented in detail from the records of the Boston Lying-in Hospital covering the years 1927 to 1940.

REFERENCES

1. Bivin, G. D. and Klinger, M. P. *Pseudocyesis*. 265 pp. Bloomington, Indiana: Principia Press, Inc., 1937.
2. Litré, E. *Oeuvres complètes d'Hippocrate*. Vol. IX. 468 pp. Paris: J. B. Baillière et Fils, 1861. P. 59.
3. Willis, R. *The Works of William Harvey, M.D.* 624 pp. London: Sydenham Society, 1847.
4. Mauriceau, F. *Traité des maladies des femmes grosses, et de celles qui sont accouchées*. Sixth edition. 555 pp. Paris: Compagnie des Libraires, 1721.
5. Girard of Lyon, cited by Husson, H. M. De deux observations envoyées par le citoyen Morlanne, de Metz, et le citoyen Girard, de Lyon. *J. de méd., chir., pharm., etc.* 1:470-474, 1801.
6. Schmitt cited by Montgomery, W. F. *An Exposition of the Signs and Symptoms of Pregnancy*. Second edition. 568 pp. Philadelphia: Blanchard & Lea, 1857.
7. Underhill, J. W. Observations upon pseudocyesis, and upon the relation of pregnancy to capital punishment. *Tr. Obst. Soc. Cincinnati* 1:66-86, 1877.
8. Charcot cited by Bouchecourt, A. Sur la grossesse nerveuse ou imaginaire. *Lyon méd.* 69:19-21, 1892.
9. Maryanchuk, N. De la grossesse fausse ou imaginaire. *Nouv. arch. d'obst. et de gynéc.* 9:241-251, 1894.
10. Mitchell, S. W. Pseudocyesis spurious pregnancy. *Med. News* 66:333, 1895.
11. Donald, A. Phantom tumour. *Practitioner* 58:254-264, 1897.
12. Janet, P. *Névroses et idées fixes*. Vol. II. 559 pp. Paris: Félix Alcan, 1898.
13. Lemesle, H. Fausses grossesses et grossesses nerveuses. *Rev. de l'hypnot. et de la psychol. physiol.* 16:178-182, 1901.
14. Le Menant des Chesnais, F. Fausses grossesses nerveuses. *Rev. de l'hypnot. et de la psychol. physiol.* 16:277-282, 1901.
15. Pohl, H. J. Zur Casuistik der eingebildeten Schwangerschaft. *St. Petersb. med. Wchnschr.* 18:358, 1901.
16. Berkeley, C. *Diseases of Women by Ten Teachers*. Second edition. 641 pp. London: Edward Arnold & Co., 1922.
17. Haultain, W. F. T. *A Practical Handbook of Midwifery and Gynecology for Students and Practitioners*. 316 pp. London: Faber & Gwyer, 1926.
18. Williams, J. W. *Obstetrics: A text-book for the use of students and practitioners*. Fifth edition. 1076 pp. New York: D. Appleton & Co., 1924.
19. Gooch, R. *On Some of the Most Important Diseases Peculiar to Women*. 235 pp. London: New Sydenham Society, 1859.
20. DeLee, J. B. *Principles and Practice of Obstetrics*. Fifth edition. 1140 pp. Philadelphia: W. B. Saunders Co., 1928.
21. Pajot, C. *Traité d'obstétrique et de gynécologie*. 679 pp. Paris: H. Lauwereyns, 1882.
22. Barnes, I. C. Two cases of simulated pregnancy. *Lancet's Lancet* 1:134-137, 1896.
23. Bodenheimer, J. M. Pseudocyesis. *New Orleans M. & S. J.* 81:632-634, 1929.

THE MANAGEMENT OF PRE-ECLAMPSIA*

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IN DISCUSSING the management of pre-eclampsia, it is essential to reach some common understanding relative to a definition of the so-called "toxemias of pregnancy." In October, 1937, at the suggestion of Dr. Foster Kellogg, of Boston, a committee was appointed by the American Committee on Maternal Welfare to attempt to secure a uniform classification of the toxemias of pregnancy. This committee has reached a tentative classification, which may be modified more or less as time goes on. According to the committee's report,¹ the main headings consist of: hypertensive disease; renal disease; pre-eclampsia, mild; pre-eclampsia, severe; eclampsia; vomiting of pregnancy; and unclassified toxemia. These are covered in the following outline:

A. Disease not peculiar to pregnancy

I. Hypertensive disease (hypertensive cardiovascular disease)

- a. Benign (essential), mild, severe
- b. Malignant

II. Renal disease

- a. Chronic vascular nephritis or nephrosclerosis
- b. Glomerulonephritis
 - (1) Acute
 - (2) Chronic

c. Nephrosis

- (1) Acute
- (2) Chronic

d. Other forms of severe renal disease

B. Disease dependent on or peculiar to pregnancy

I. Pre-eclampsia

- a. Mild
- b. Severe

II. Eclampsia

- a. Convulsive
- b. Nonconvulsive (that is, coma with findings at necropsy typical of eclampsia)

C. Vomiting of pregnancy

D. Unclassified toxemias

I shall not discuss the management of any of these conditions except those falling under pre-eclampsia. Concerning this condition, the report contains the following remarks:

Pre-eclampsia, mild. Mild pre-eclampsia is the term applied to that condition which may or may not arise during pregnancy, almost always after the twenty-fourth week, characterized by a moderate rise of the systolic blood pressure to about 140 to 160 mm. of mercury and a diastolic blood pressure of 90 to 100 mm. of mercury. The urine contains less than 0.6 gm. of albumin per 100 cc., and the edema is usually slight and rarely may be absent. Usually no changes are demonstrable in the retinal arteries. Many of these patients have a latent hypertensive tendency. Few of them experience the severe pre-eclampsia, and fewer still have eclamptic convulsions. However, there are as yet no

*Presented at the New England Postgraduate Assembly, Cambridge, Massachusetts, November 13, 1940.

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certain clinical or laboratory methods of determining the potentially eclamptic cases among the patients with mild pre-eclampsia

Pre-eclampsia severe A condition which usually becomes evident after the twenty-fourth week of pregnancy, is characterized by a sustained systolic blood pressure of more than 160 mm of mercury and usually a diastolic blood pressure of more than 110 mm of mercury. Usually accompanied by the passage of more than 0.6 gm of albumin per 100 cc of urine. The edema is severe in most cases and usually hypertensive changes may be observed in the retinal arteries. In spite of the treatment there is a tendency for the blood pressure to rise, even when the edema may have decreased. Many patients present one or more of the symptoms of impending eclampsia, such as headaches, blurred vision, epigastric pain, vomiting, torpor or irritability.

Eclampsia is probably the same disease as severe pre-eclampsia, but in addition is accompanied by convulsions. Rarely, patients with severe pre-eclampsia who die in coma without convulsions show findings at necropsy identical with those of eclampsia.

In the textbook² of obstetrics and gynecology that was published under my editorship, toxemias of pregnancy were classified as follows:

- I Nonconvulsive toxemia of pregnancy
 - A Acute (pre-eclampsia) (46 per cent)
 - B Chronic (vascular renal disease) (48 per cent)
- II Convulsive toxemia of pregnancy (6 per cent)
 - A Acute (eclampsia)
 - B Chronic (uremia)

Under the heading "Nonconvulsive Toxemia of Pregnancy," the following statements are made:

This group comprising from 75 to 95 per cent of all toxemias, is composed of those who have edema, hypertension or albuminuria during pregnancy, labor or the immediate puerperium. It includes patients in whom these symptoms develop during pregnancy and also a large group of patients in whom these symptoms and findings become marked during the pregnancy. If the patient has been previously under observation, it is possible to know whether the toxemia is acute or chronic, but if not, then it may be possible to determine this from the history and findings.

Under the heading, "Pre-eclampsia or Acute Nonconvulsive Toxemia of Pregnancy," it is stated:

This disease differs from eclampsia in that neither convulsions nor coma occur. The mild type is variously designated as the kidney nephrosis, albuminuria or edema (hydrops gravidarum) of pregnancy, and there are, as a rule, few subjective symptoms. The severe type—eclampsismus or eclampsism—implies that the patient has marked subjective symptoms, and is on the verge of convulsions or of coma.

The typical case usually shows an excessive or rapid increase in weight. If the urines are obtained under standard conditions and sufficiently sensitive tests are used, an albuminuria will probably be found fairly

early, perhaps before the change in weight is apparent. The blood pressure begins to rise, and since an increase from a systolic of 90 to one of 125 is just as significant as an increase from 125 to 155, it is important to know the basic pressure. The maximal normal systolic blood pressure is arbitrarily placed at 129 mm. If the patient is over thirty, some allowance must be made for her age. Practically all patients with pre-eclampsia begin as mild cases and the condition may remain stationary or progress slowly. Usually, however, the signs increase, and as the condition grows worse, further subjective symptoms appear which indicate that it is likely to change from the nonconvulsive to the convulsive or eclamptic type.

The patient may have one, two or the whole triad of symptoms of nonconvulsive toxemia in varying degrees. Thus, one patient may have only a marked edema, another an albuminuria and a third perhaps only a hypertension. If increased blood pressure is the only finding, the condition is probably one of essential hypertension.

One has to recognize that a clear-cut distinction between these different conditions is often extremely difficult. The symptoms are not characteristic, nor are the findings pathognomonic for any one condition. There is overlapping between the various groups. The mild type may pass into the severe, and the severe may pass into the eclamptic. There is also confusion and difficulty in differentiating hypertensive disease, pre-eclampsia, and the acute and the chronic conditions. About the only way that this can be done satisfactorily is by following the patient not only throughout the course of the pregnancy but also during the subsequent post partum period for a number of months or even of years. It is often of help to know the antecedent history of the patient, and frequently, if it is possible, it is extremely helpful to know what the status of the patient was prior to the existing pregnancy. Often the history of the course of events in preceding pregnancies is helpful in making the diagnosis. Thus a patient can give a history of having had antecedent renal or vascular diseases either in the non-pregnant or in the pregnant state, this helps differentiate pre-eclampsia from eclampsia and other forms of so-called "toxemia of pregnancy."

Stander³ in a recent article approves the classification adopted by the American Committee on Maternal Welfare and accepts Kellogg's term, "mild pre-eclampsia," as a substitute for the designation, "low reserve kidney," proposed by him earlier. His criteria were hypertension of less than 150 systolic, 90 diastolic, which resumes the normal level after the puerperium, and albuminuria of less than 2 gm per liter, which rapidly disappears in the post partum period. There is nothing abnormal in the clinical constituents of the blood or urine, and subsequent pregnancies are

usually free of this condition. Stander gives the incidence of mild pre-eclampsia as 47 per cent, severe pre-eclampsia as 7 per cent, and eclampsia as 4 per cent in 104 toxemias occurring in 1503 pregnancies. Stander³ and Dieckmann and Brown⁴ found toxemia in as high as 10 per cent of pregnancies, about half of which fell in the pre-eclamptic group.

Evidence points to the fundamental identity of mild and severe pre-eclampsia with eclampsia. The major difference is in the intensity of the symptoms and findings. The onset of the convulsion or coma places the patient in the eclamptic group, unless these are caused by kidney disease resulting in uremia. No specific symptom or sign places these patients in the pre-eclamptic group. One must evaluate these cases from the available history and findings and decide whether they fall into the pre-eclamptic, the hypertensive or the vascular-renal group. The criterion that places them in the category of pre-eclampsia is a history of freedom from symptoms prior to or early in the pregnancy or in previous pregnancies.

The following findings are of diagnostic significance. Edema and weight gain are important when they are rapid or excessive. A definite but moderate gain in weight within a few days means more than a greater gain over a longer period. The normal patient may gain 20 to 25 pounds during pregnancy, but one whose weight has increased 2 or 3 pounds in a few days or a week should be regarded with great suspicion. Urinary findings of persistent albuminuria and increased number of formed elements are significant. A rapid or slow increase of blood pressure after the twenty-fourth week is indicative of pre-eclampsia. It is the increase that is significant. The rise of systolic pressure from 90 to 130 is just as important as one from 110 to 150. Insufficient attention is paid to the diastolic pressure, which is less variable than the systolic. The cerebral, visual and gastrointestinal symptoms are the danger signals showing the beginning of a severe toxemia. Urinary output in a diminishing quantity suggests strongly a disturbed water metabolism or impaired kidney function in the presence of a normal intake.

One may state that there is no specific treatment for pre-eclampsia unless the termination of pregnancy can be so regarded. If one were in a position to disregard the fetus, this would be the indicated procedure, which has two main objections: one is that no pregnancy resulting in fetal loss has been worth while; the other is that the artificial termination of pregnancy carries a danger to the mother and to the fetus alike. In the management of these patients, one is confronted with the problem of safeguarding two beings, the mother and the fetus, whose best interests are frequently

in conflict. That which is safer for the one may carry danger to the other.

In the management of the toxemias of pregnancy, there are two main viewpoints. First, one must consider the management of pregnancy, and secondly, it is necessary to treat the toxemic state. So far as the management of the pregnancy is concerned, I believe I should discuss my attitude toward the prevention of the pre-eclampsia. Since one cannot foresee the development of pre-eclampsia in a woman who has never been pregnant, this problem is present only in those patients who have had a previous pre-eclampsia or eclampsia.

There are no clear-cut criteria by which these various conditions can be differentiated, because hypertensive disease may first reveal itself during pregnancy, and because vascular-renal disease may also first be discovered during pregnancy. Another factor of importance is that the pre-eclampsia or eclampsia may so damage the cardiovascular-renal system of the patient that she does not subsequently recover. The amount of permanent damage done to the organs has not yet been determined, since there are no adequate criteria for judging the amount of anatomic or physiologic injury. I am of the opinion that the duration and the severity of the disease in a pregnant woman are the determining factors, and that a protracted course, even though apparently mild, does more damage than a severer but shorter attack of pre-eclampsia or even of eclampsia.

Attempts have been made to follow the patients during subsequent months and years, and there is no doubt that they have less subsequent interference with the functional capacity of their organs than those who have hypertensive or vascular-renal disease. However, I know of no study that has satisfactorily correlated the duration and severity of pre-eclampsia and eclampsia with subsequent events. One must remember that in pre-eclampsia one is dealing with an acute condition that may or may not lead to full recovery. In hypertensive and vascular-renal disease, one is confronted with an established disorder, which may be alleviated and arrested but cannot be cured.

Obstetricians are frequently handicapped by the fact that they have to rely almost entirely on the patient's history of the course of events in a previous pregnancy. If the patient gives a history of a previous toxemia, one should first attempt to establish the integrity of her organs. Before again becoming pregnant, she should be in good general health and free of symptoms of cardiovascular-renal disease, that is, the blood pressure, renal function and eye grounds should be normal. Very simple renal functional tests are total output and

ability to concentrate the urine; a uric clearance test may be done. It is difficult to know whether persistent changes of this character have been caused by some pre-existing disease, such as hypertension or vascular-renal disorders, or whether they have resulted from a pre-eclamptic or eclamptic attack, nevertheless, so far as future pregnancies are concerned, unless these conditions can be cleared no subsequent pregnancies should be permitted, because all of them are aggravated by a subsequent pregnancy. It should, however, be recognized that pre-eclampsia and eclamptic conditions are less apt to be followed by permanent damage than the vascular-renal disorders, which once established are apt to be persistent.

One must also consider the proper attitude toward a condition of this kind that manifests itself early in pregnancy. It is only in exceptional cases that pre-eclampsia appears before six months gestation, so that the question of the termination of the pregnancy rarely arises before that period. When any of these signs and symptoms occur prior to that time, the weight of evidence favors either hypertensive or vascular-renal disease rather than a pre-eclamptic state. Any progressive condition of this sort that develops early in pregnancy should lead to the termination of the gestation, otherwise the mother's condition is aggravated, she is apt to suffer permanent damage, and the chances for securing the survival of a viable fetus are not good. There is also the threat of ante-partum fetal death, especially in the vascular renal type of the disease.

The objectives of management are to prevent maternal and fetal deaths and to avoid serious or permanent damage to the tissues and organs of the mother. To state the problem in different words, every effort should be made to protect the health of the mother and to secure a viable, living fetus. This fetus should be sufficiently mature to have a reasonable chance of surviving the neonatal period. To protect the mother, one must detect the condition early, watch its course closely and manage it from the interest of both the mother and the fetus. It must be remembered that no prospective mother is completely satisfied, at least psychologically, unless she has a living baby. One must never forget that although many women do not have a recurrence of this condition in a subsequent pregnancy, nevertheless, all things considered, the existing pregnancy is the most favorable one for securing a living baby. There are no absolute criteria for determining the best course to follow for either the mother or the fetus. The final decision rests on mature judgment derived from the careful evaluation of the symptoms and findings and the progress of the disease. There is no specific treat-

ment for this condition. The management is, therefore, largely symptomatic and consists mainly of watchful expectancy under the most favorable possible conditions, for the mild case may become severe, and the severe may become eclampsia. Because the rate of progress is by no means uniform, one must watch the course of events very carefully. A mild pre-eclampsia, or even a severe one, may never develop into an eclampsia. On the other hand, a fulminating eclampsia may develop with relatively scant evidence of a transient pre-eclampsia. It is interesting to note that whereas the incidence of eclampsia has been reduced, there has been no evidence to prove that pre-eclampsia has diminished. One must therefore conclude that in all probability the eclampsia was the result of the neglect of the pre-eclamptic condition. There is little evidence that the dietary and other management of pregnancy has reduced the incidence of the condition, although it is quite possible, in fact probable, that its severity has been ameliorated by proper ante-partum management. There is no specific preventive treatment for pre-eclampsia. One should endeavor, however, to maintain the patient in the best possible physical state by securing optimal nutrition and hygiene throughout the course of the pregnancy. She should receive proper nutrition, adequate rest and recreation and should have good elimination, in other words, normal health habits. It would, of course, be better to have the patient in the best physical condition before pregnancy occurred. After conception, every effort should be devoted to relieving symptoms, such as nausea and vomiting, and to correcting nutritional abuses and faulty habits of living. Even though one is unable to prevent the development of a pre-eclampsia, the patient would be in better physical condition to withstand the development of this disease.

The important triad of symptoms and signs are increase in blood pressure; development of edema shown either by soggy skin or pitting of the tissues and by rapid increase in weight; and development of an albuminuria.

When any of the symptoms or signs of pre-eclampsia develop, a more rigid regime should be instituted and should vary with the severity of the signs and symptoms. The diet should be restricted, and should consist, so far as possible, of fruits and vegetables with a moderate amount of protein—in other words, a maintenance protein intake. A salt poor or salt free diet should be given. The fat should also be restricted; preferably no fat other than milk fat should be used. Lean meats and eggs may be used. No fried foods or pastries should be given. Fish, pork and veal should be eliminated from the diet. The protein

intake should be about 60 gm., with approximately 30 gm. of fat and 400 gm. of carbohydrate, a total of about 2100 calories a day. Fresh vegetables may be used in the form of salads, but oil dressings should be omitted. In severe cases, the diet may be further restricted for a week to fruit juices with sugar and possibly some skimmed milk—about 1200 to 1500 calories. In mild cases, rest at night of eight hours, with one or two hourly periods of rest during the day, may be sufficient. Sedation may be required to secure adequate sleep, the barbiturates being preferable. Urinary output should be watched, and gastrointestinal elimination should be secured. When the patient is placed at bedrest, an apparent disappearance of the edema should not be confused with a shift in the edema to the dependent portions of the body. In the severer cases in which there is marked edema or anuria, the fluid intake and output should be closely watched, and if necessary intravenous injection of 10 to 20 per cent glucose should be utilized to promote diuresis. If the patient fails to respond favorably to this treatment of rest, diet and elimination with sedation, it is necessary to decide promptly whether to terminate the pregnancy.

If the condition remains stationary so far as the symptoms and signs indicate, more time may be allowed for reaching a decision. One good rule to follow is that when there is nothing to gain for the fetus, the health and life of the mother should not be imperiled by delaying the termination of the pregnancy. In the pre-eclamptic state, there is little danger of ante-partum death of the fetus. The main causes contributing to the fatalities of the fetus and the newborn are mechanical induction of labor, artificial termination of labor other than cesarean section, and previable or early premature births. The outlook for the fetus is always better if the onset of labor is natural and its termination is without unnecessary interference. There is little evidence that low-forceps operation or delivery by cesarean section is an increased hazard to the fetus, although it may be to the mother.

The period of gestation at which hypertension, edema and albuminuria with visual and other symptoms develop naturally determines somewhat the course to be pursued. If these symptoms develop before the twenty-fourth week of gestation, there is little to be accomplished by delay unless they disappear very rapidly under appropriate treatment. If they appear after the twenty-fourth week in a severe form with no response to treatment within a week, the pregnancy should be terminated; if in a mild form, expectant treatment may be used. If the mild condition is progressive, pregnancy should also be terminated after a

week or ten days of adequate treatment without improvement. In a patient with a progressive pre-eclampsia, either mild or severe, that occurs earlier than two weeks prior to fetal viability, expectant treatment is contraindicated, especially in those cases in which there is no improvement within a week of adequate treatment. In pre-eclamptic patients in whom the fetus is dead or previable, the termination should always be from below. It usually requires some mechanical form of induction, such as rupture of the membranes, the use of a bag or Willett's forceps, or vaginal hysterotomy. When the fetus is previable or dead, destructive operations are not necessarily contraindicated.

When the pregnancy has reached a period verging on fetal viability, the problem is often complicated and difficult to answer. An attempt to prolong the gestation in the interest of the fetus should be made if it can be done without imperiling the health and life of the mother. When the pregnancy has reached term, there is little to gain for the mother by prolonging the gestation, and every effort should be made to have the pregnancy terminated prior to the development of a severe pre-eclampsia or an eclampsia that materially increases the hazard for both the mother and the fetus, because under those circumstances one has to deal with an emergency situation. The best outlook for both mother and baby is obtained when there is a natural onset of labor with as nearly natural a termination as possible. If it is possible to prolong the gestation until the cervix is soft, a medical induction with castor oil and quinine may be sufficient to initiate labor. Pituitary extract for the induction of labor should be used with extreme caution in toxic patients. A second attempt at medical induction may be made when the first one fails. There usually should be an interval of at least a day between attempts at medical induction. Mechanical induction consists in simple rupture of the membranes, the introduction of a bougie or bag or the use of Willett's forceps, which is not advised except in cases of previable or dead fetuses. Braxton-Hicks version may also be tried, but it is a dangerous procedure so far as the fetus is concerned and should not be employed except in cases of previable or dead fetuses. When the cervix is not soft, mechanical induction of labor is accompanied by a very high fetal mortality and some risk to the mother. Every effort should be made to carry the mother to the period when the cervix is soft so that the medical induction has a fair chance of being successful. When the necessity for terminating the pregnancy is urgent and the cervix hard, one is confronted with the serious problem

of deciding between the mechanical induction of labor with danger to the fetus or the possibility of doing a cesarean section with relative safety to the fetus. The latter should be done only in those cases in which the outlook for the fetus is excellent and in which the environmental conditions are such that it can be done with great safety to the mother.

Many other factors, such as age, parity, fertility, personnel and environment, have more or less weight in determining the final decision. These patients can be best cared for only by adequate preconceptional, ante-partum, intra-partum and post-partum care in the office, the home and the hospital. The danger to the mother entails risk to

the fetus, which arises not from the toxic state itself but from the procedures used to terminate the pregnancy. The management of toxemias should be designed to preserve the health and lives of both the mother and the fetus and should consist in the judicious use of medical and obstetric procedures at the proper time and place and in the approved manner.

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REFERENCES

- 1 American Committee on Maternal Welfare *The Mother* 1-14, 1940
- 2 Adair, F. L. *Obstetrics and Gynecology* Vol 1 1000 pp Philadelphia Lea & Febiger, 1940 P 723
- 3 Stander, H. J. New classification of toxemias of pregnancy *Am J. Surg* 45 112 117, 1940
- 4 Diekmann, W. J. and Brown, I. The obstetric management of patients with toxemia *Am J. Obst. & Gynec* 38 214 219, 1939

MEDICAL PROGRESS

ETIOLOGY AND TREATMENT OF URTICARIA: DIAGNOSIS, PREVENTION AND TREATMENT OF POISON-IVY DERMATITIS

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URTICARIA

URTICARIA should be thought of not as a disease manifesting itself solely in the skin but as a process capable of involving many other structures and organs of the body. Typical urticarial wheals have been demonstrated in the stomach by gastroscopic examination. Involvement of the throat or larynx is not rare and creates an emergency situation in some cases. Apparently, urticarial swellings may occur wherever loose connective tissues exist. On the basis of these considerations, it would be possible, on theoretical grounds, to account for a number of disorders as manifestations of an internal type of urticaria. For example, urticaria might extend to the lungs producing a form of pulmonary edema, to the heart producing paroxysmal tachycardia, to the brain causing headaches, to the bladder creating hematuria, and to the urethra causing anuria.

Urticarial wheals, therefore, represent an important study in pathologic physiology, and the mechanism of wheal formation deserves close scrutiny. Of great interest and importance is the fact that wheals can be produced experimentally by an immunologic technic that represents a probable reproduction of the actual disease process. This

method of wheal production may be described as follows. A small amount of blood serum (0.01 to 0.05 cc.) removed from a food-sensitive patient is injected intracutaneously into a subject. After the passage of twenty-four to forty-eight hours, the subject is fed a definite amount of the specific offending food to which he has been locally sensitized. From two to ninety minutes after ingestion of the food, a reaction consisting of a wheal surrounded by erythema and accompanied by pruritus appears at the passively sensitized site. This interesting procedure has been described and studied with great care by Walzer and Walzer.¹ It corresponds to the Prausnitz and Küstner test of local passive transference of hypersensitivity.

Straus² has reported that the rhesus monkey will accept passive transference of local skin hypersensitivity from human reaginic serums. This fact is of absorbing interest and may prove to be of great value in the experimental study of urticaria and allied skin disease. In this same connection, Sherman, Stull and Hampton³ have discovered that the serum of guinea pigs sensitized by injection of pollen toxoid contains a substance that will produce passive transitory sensitization of the human skin. In the study of urticaria, therefore, it is now possible to make experimental use of the rhesus monkey and the guinea pig.

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The question of whether or not the wheal reaction actually represents a form of allergy has been a source of much discussion. It seems true, as indicated by Sulzberger and Goodman,⁴ that some types of urticaria are definitely not allergic. These authors point out that "primarily urticariogenic agents such as morphine, codeine, atropine, pilocarpine, histamine and choline" do not produce urticaria of a clear-cut allergic type. Blum and West⁵ studied a case of urticaria due to blue and violet light. They investigated the wave lengths of these colors, as well as other angles of the problem, and concluded that the true cause was carotenoid pigment rather than any conceivable type of allergy. In Urbach's⁶ review of 500 cases of urticaria, he noted that only 20 per cent could be interpreted as forms of allergy. Winkelwerder⁷ has written a thesis concerning the relation between urticaria and angioneurotic edema, and has concluded that both urticaria and angioneurotic edema are symptoms of an underlying physiologic disturbance, not necessarily an allergy.

The allergic types of urticaria and angioneurotic edema are common and represent in all probability a true antigen-antibody relation in cases of pollen sensitivity, serum disease and foreign-protein reactions. It must be pointed out again, however, that in urticaria due to drugs no one has been able to demonstrate a true antigen-antibody relation. Nevertheless, recent investigations have shown that simple chemicals when combined with proteins take on the characteristics of true antigens. In such cases, the specificity of sensitization to the chemical protein conjugate depends on the simple chemical attached and not on the protein. It is possible that urticaria-producing drugs, such as aspirin, may combine with body proteins and become allergenic.

Urticaria is a disease of great prevalence, and the usual case is so easily diagnosed that most patients know what ails them before consulting the physician. It is probable that few people pass through life without having an attack of hives. The attacks are often mild and of short duration, and spontaneous disappearance may take place in a few hours, before the necessity of consulting a physician becomes apparent. Many other cases, however, present the most resistant and baffling dermatologic problems. It is likely that a considerable percentage of all patients, including the resistant ones, do not consult specialists but rely on general practitioners for treatment of their difficulties.

On the basis of clinical experience, it is natural to divide urticaria into acute and chronic types. The acute form usually runs a brief course, lasting from a few days to two or three weeks, and terminates, as a rule, in complete recovery. Al-

though the symptoms of acute urticaria may be relieved and the duration of the disease may be shortened materially by proper treatment, the attack will subside spontaneously without any treatment whatsoever. The evaluation of treatment of urticaria is difficult, but it is particularly hazardous in acute urticaria. The value of therapy can be determined more safely in the study of the chronic type of cases that have lasted for months or years.

There seems to be fairly general agreement that skin tests in urticaria are of decidedly limited value and are to be recommended not as a routine plan of study but as a last resort in stubborn cases. As Ormsby⁸ puts it, "In hives, skin tests are often positive to substances that are innocent and negative to substances that are causal." As pointed out by Traut,⁹ the urticarial reaction differs from true allergy in not being mediated by the reagin mechanism, and in the absence of reagins, cutaneous tests usually give negative results. On the other hand, false reactions are to be expected quite commonly on the basis of the dermatographia usually present in association with urticaria.

In the search for the etiology of acute urticarial recurrences, the patient's own observations regarding causative agents are of the greatest value. Intelligent patients will usually make observations of considerable interest and importance, particularly if there have been regular attacks caused by specific foods or drugs. With patients who have not become fully aware of the eliciting agents in their attacks of hives, well-focused history taking may establish a demonstrable chronologic sequence between ingestion of specific substances and the appearance of attacks. If a careful history fails to give a clue, the elimination diet (Rowe¹⁰) or a dietary diary may be employed. In this type of investigation it is of value to bear in mind the list of foods and drugs which are likely to cause hives. Frequent causes are the following (Wise and Sulzberger¹¹):

FOODS	DRUGS
Shell Fish	Quinine
Fish (including caviar)	Ipecac
Strawberries	Salicylates
Cheese	Barbiturates
Nuts	Iodides
Eggs	Bromides
Wheat	Phenolphthalein
Milk	Morphine
Pork	Other opium derivatives
Chocolate	Antipyrine

These two lists will account for the majority of cases of acute urticarias, but it must be remembered that no food or drug can be said to be incapable of producing urticaria.

Certain pitfalls may be encountered in the study of urticaria. These may be enumerated as follows¹²:

A certain food may elicit a severe attack at one time but not at another (sensitive and nonsensitive phases).

A food such as fish or dried fish, if fresh, may fail to produce hives—but if not absolutely fresh will cause an attack.

Vegetables and fruit grown in one region may cause hives, whereas the same vegetables and fruit grown in another region may fail to do so.

Certain combinations of foods may be followed regularly by an eruption—whereas these foods individually may be without harmful effect.

The time between ingestion of food and eruption may vary between minutes to hours or days.

Following a single exposure to a sensitizing substance, urticaria may last varying lengths of time—from a few hours to many weeks. Drug eruptions often last for long periods of time.

Urticaria may be produced by inhalation of the following substances¹³: feathers, orris powder, animal danders, pollens, ephedrine and other nasal sprays, and various dusts, such as house, silk, cotton and kapok.

In the management of cases suspected of being of inhalant origin, the patient's rooms, especially the bedroom, should be made as dust free as possible; furnishings stuffed with feathers, kapok or cotton, especially pillows and mattresses, should be removed or covered with so-called "allergen-proof" materials. The patient as well as the friends and relatives in his immediate environment should be forbidden the use of all cosmetics and toilet preparations except those of nonallergic nature.

Localized hives may be produced by contact allergens such as the following: silk, wool, dyes, cosmetic preparations, flour, fur, fur dyes, eggs, rose-perfumed bath salts and lemon peel. Allergens such as these, acting externally, are capable of producing not only localized urticaria, but also vesicular contact dermatoses. Furthermore, by absorption through the skin, they can produce generalized urticaria. It is interesting to ponder that the skin of one patient will react to an agent such as wool with vesicle formation, whereas the skin of another will respond to wool only with wheal formation.

In the study of chronic urticaria it may well be borne in mind that discovery of the cause is usually far more difficult and less likely than in acute urticaria. Well-directed investigation of cases of chronic urticaria should include a careful survey of possible food factors and inhalants, close attention to drugs and search for foci of infection.

In the management of chronic urticaria, all drugs previously administered should be discontinued at the outset of study and therapy. The most frequent offenders include morphine, salicylates, barbiturates and laxatives. The following

potentially causative agents should be inquired for in the carefully focused history¹⁴: laxatives, sedatives, soporifics, tonics, douches, contraceptives, nasal sprays, eye drops, mouth washes, tooth powders, tooth pastes, hair dyes, scalp lotions and iodized salt.

A patient with chronic urticaria using any of the agents mentioned above should discontinue them for at least six weeks. In addition, if the case is stubborn, it is well to exclude as rigidly as possible feather-stuffed furniture and bedding, and cosmetics containing dyes or perfumes. Nonallergic cosmetics should be prescribed for the patient, as well as those in intimate contact with the patient.

Foci of infection represent a common cause of chronic urticaria, in fact one of the most prevalent. Apparently, teeth represent the commonest focus. Dramatic cures of chronic urticaria have been reported following removal of nonvital teeth in which the apical infection was so slight that it could not be demonstrated by roentgenography.¹⁵

Nervous and emotional stress and strain can without any doubt elicit urticarial attacks. This aspect of urticaria has been studied in admirable fashion in this country by Stokes and his co-workers.¹⁶ His contributions to this field should merit careful reading by all interested in the problem of urticaria.

Of considerable interest in the literature of recent years are the unusual and unexpected etiologic agents that have come to light. A scrutiny of some of these agents should broaden the understanding of the etiology of urticaria, and should help one to deal with the many unsolved cases of chronic urticaria with which one is so often confronted. As one reflects on some of the bizarre cases that have been investigated successfully and reported, it becomes increasingly easier to comprehend why many such urticaria cases remain unsolved, even when studied in clinics operated by highly skilled workers and fully equipped with all modern laboratory apparatus. Those cases found to be due to foci of infection have seemed to be particularly difficult problems.

Many of these interesting cases of urticaria have proved to be due to simple causes, which have remained unidentified for months or years, in spite of the fact that in the end they seemed almost obvious and not deserving of so much diagnostic difficulty. For example, Rappaport¹⁷ studied a case of chronic urticaria in a dentist and found him sensitive to acrolein, formed by the oxidation of glycerin in cigarettes. The patient could smoke with impunity cigarettes containing no glycerin, but after a drop of glycerin had been placed on such a cigarette, an attack of hives would appear as

the cigarette was smoked. As one might well predict, this patient suffered from hives when eating steak broiled over a hot flame, or when eating broiled fish, owing to his absorption of acrolein formed by the oxidation of fat. (Acrolein is related to formaldehyde, and is a very active aldehyde produced in any food containing fat or prepared with fat if sufficient heat is produced, as in broiling or frying.)

One of my cases proved to be an interesting example of a type of urticaria found in the end to be due to a simple cause overlooked in spite of careful previous studies over a period of one and a half years. The history of the case was lengthy and difficult to analyze. It was found, however, that the patient's occupation involved contact with and handling of numerous dye chemicals. The patient himself had observed that inhalation of formalin vapor made his attacks worse. He had also noted that when away from the factory on vacations he had no difficulty. Physical examination showed numerous large urticarial wheals and violent dermatographism. While in my office, the patient consented to inhale some formalin fumes as a test. After an interval of about ten minutes he broke out with about a dozen additional urticarial wheals associated with extreme itching. Remembering that formalin vapor can be neutralized rapidly by spirits of ammonia, I had the patient moved to a second room and inhale spirits of ammonia. The itching disappeared instantly, but the hives remained unchanged. One would expect the edema of urticaria to be slow in absorption even after removal of the cause. After these tests and after explanations, the patient was able to recall that he could work without difficulty in the dye factories that did not use a formalin-fixation system. The skin tests were particularly interesting: A drop of formalin placed on the skin produced no reaction for an interval of about ten minutes until gross chemical irritation began to appear. A second drop of formalin, applied to the skin and followed by a tiny puncture, produced immediately a typical wheal, which was promptly reduced in size by application of spirits of ammonia. In other words, the horny layer of the skin in this case did not react to formalin except as a consequence of gross chemical irritation, but the blood vessels exposed by a tiny puncture responded to formalin promptly. The implications in regard to prevention and treatment of attacks in this case were obvious. The patient found that his itching could be taken care of very satisfactorily by carrying in his pocket a small bottle of spirits of ammonia and by inhaling the ammonia vapor when exposed to formalin vapor.

Waldbott and Ascher¹⁸ have studied and re-

ported 5 interesting cases of urticaria of the serum-sickness type. These cases all had a definite incubation period of five to nine days, and all were associated with fever and joint and glandular swellings. The clinical picture, therefore, was typical of serum sickness. In 4 of these cases, the condition was brought on by means other than injections, such as ingestion, contact and infection. There was one case of chronic urticaria of four years' duration. The attacks came every six weeks, lasted four or five days, and were each preceded by a flare-up of an old chronic dermatophytic infection of the feet. This case showed a prompt therapeutic response to local applications to the feet and the injection of autogenous fungous extracts. Wise and Sulzberger¹⁹⁻²⁰ believe "fungi of the trichophyton group to be definite but relatively infrequent causes of clinical urticaria." These investigations demonstrate that in studying cases of chronic urticaria one should always examine the feet and other areas of skin for evidence of dermatophytosis and weigh such evidence as a part of the problem. Perhaps some of the many unsolved cases will be found to be due to foci of fungous infections.

Another case studied by Waldbott and Ascher was that of a thirty-nine-year-old dentist. The clinical picture was that of a generalized severe form of urticaria and was found to be due to aspirin. After stopping aspirin the skin condition persisted eight days and then disappeared entirely. One grain of aspirin taken by mouth produced severe urticaria within ten minutes. Of considerable interest in reference to this case was the fact that the scratch and patch tests with acetylsalicylic acid were entirely negative.

Sulzberger, Goodman, Byrne and Mallozzi²¹ in their careful investigation of the subject of cheilitis due to lipstick, found 2 cases in which the cheilitis was associated with chronic urticaria. Both the cheilitis and chronic urticaria disappeared when exposure to the dye of the lipstick ceased—cheilitis due to lipstick is caused, in most cases, by the dye rather than by the perfume or other ingredients. In one case the patient deliberately applied her old type of lipstick again, and both cheilitis and generalized urticaria recurred. From these observations it may be said that lipstick represents one of the easily missed causes of urticaria.

An intensely interesting and important chapter in the knowledge of urticaria concerns the type caused by physical agents, with particular reference to heat. The subject has been much better understood since the work of Grant, Pearson and Comeau,²² reported in 1936 and reviewed in the paragraphs to follow. It is likely that many cases of urticaria provoked by heat fit into the chronic

resistant group and are often not recognized and treated properly.

The term "physical allergy" was described by Duke² in reference to a special group of conditions, which may be enumerated as follows: bronchial asthma, vasomotor rhinitis, conjunctivitis, photophobia, abdominal pain, erythema, pruritus, urticaria, and angioneurotic edema and shock. This list represents a group of symptoms that may be "caused specifically and solely by the action of a physical agent, such as light, heat, cold, mechanical irritation, freezing and burns, and, in the case of heat sensitivity, indirectly by mental and physical exertion."

Recent studies of the important subject of urticaria provoked by heat or by psychic stimuli have been carried out by Hopkins, Kesten and Hazel,³ who have also reviewed the literature in an illuminating manner.

Experiments have shown that generalized urticaria due to heat, physical exertion or emotional excitement is brought out by a highly interesting physiologic and biochemical mechanism. Grant, Pearson and Comeau²² have presented convincing evidence that the lesions are produced by release of acetylcholine at the termination of cutaneous nerves—the first demonstration of a mechanism by which a psychic stimulus can produce a definite lesion in the skin. These workers made the following observations:

If one leg of a patient with 'heat urticaria' is placed in hot water, a generalized outbreak of wheals will appear anywhere except on the heated skin. The leg becomes flushed but is usually without wheals. This indicates that the wheals are not produced by the direct effect of heat on the skin.

If before such a test the circulation of the leg is occluded by a cuff, no wheals appear until after the cuff is released and circulation restored. This indicates that the essential stimulus is transmitted from the heated skin by the blood and not by the nerves.

If in a similar experiment the circulation in one arm is occluded by a cuff, although no wheals appear while the arm is ischemic, 'numerous bluish spots of local vasodilation' can be seen. This indicates that the stimulus is carried to the area in which wheals develop by nerves and not by the blood. If at a suitable time the circulation is released and the capillary pressure restored, wheals immediately appear, usually in these spots of vasodilation.

Attacks of urticaria can be produced in these patients by acetylcholine.

These experiments with heat indicate that the urticaria in these cases was produced by a nerve impulse reaching the skin from some central heat-regulating center stimulated by the arrival of warmed blood from the extremity.

Both normal and heat-sensitive patients react

with dilatation of cutaneous blood vessels when one extremity is heated. They also show these reactions to emotional stimuli. In other words, an increase in body temperature or a purely psychic stimulus may excite the sweat gland nerves and the autonomic vasodilation fibers to secrete acetylcholine in normal subjects and in heat-sensitive patients. The essential abnormality of the latter is that acetylcholine produces wheals in their skin.

There seems at present no proof of the nature of the abnormal reaction to acetylcholine by these patients. One is tempted to assume that the patients are specifically allergic to this chemical, but there is as yet no evidence that allergy to acetylcholine can be produced. Hopkins and his associates²⁴ attempted passive transfer tests of sensitivity by means of the serum of heat urticaria patients, but the results were inconclusive. The evidence indicates, however, that whether the urticaria follows exposure to heat, exercise or nervous excitement, it is caused by a direct action of acetylcholine or some related biochemical substance on the cells of the skin.

Urticaria due to heat may be brought on by the effect of a warm room, standing in front of the fire, hot baths, exposure to direct sunshine on warm days, warm bed clothing, emotional excitement, violent exercise, hot food, anger or nervousness. This type of urticaria may be relieved temporarily by a cold shower. The lesions are apt to come out in susceptible subjects after the rectal temperature has risen 0.4 to 1.2°F. A very effective stimulus may be delivered by immersion of the feet in hot water.

One of Hopkins's patients with heat urticaria was successfully treated, with complete recovery, by increasing gradually the temperature of her daily bath.

The great importance of the acetylcholine reactions of the body has been brought out by the work of Hall, Ettinger and Banting,²⁵ who produced coronary and myocardial lesions and ulcers of the stomach and duodenum both by administration of acetylcholine and by stimulation of the vagus nerve.

Treatment

The circulating allergens that produce acute hives are, with scarcely any doubt, usually of alimentary origin. Therefore, the first step in etiologic therapy is to clean out the gastrointestinal tract, unless good evidence can be obtained of the possibility that there is some less common cause of acute urticaria, such as inhalants, foci of infection or contact allergens (absorbed by transepidermal penetration). For cleaning out the intestinal

tract, Wise and Sulzberger²⁶ recommend calomel in a dose of 3 to 6 gr. at night, followed in the morning by a saline cathartic. Daily morning doses of a saline cathartic may be continued for several days. The food should be bland and the intake limited. Fluids should be forced to aid elimination of allergens. Violent exercise should be avoided, because it increases the blood supply to the skin and increases the severity of symptoms. Alcohol should be avoided, because it tends to increase absorption of allergens from the gastrointestinal tract and also increases the blood supply to the skin.

Some of the newer methods of therapy in urticaria should be described. Many of these are based on physiologic mechanisms of clear-cut etiologic importance. Others are more empirical in nature. The evaluation of therapeutic measures used in treating urticaria is hazardous because it is impossible to anticipate the course of the disease in any particular case. Even severe cases of long duration may exhibit sudden and inexplicable spontaneous remissions. This fact probably accounts for the large number of remedies that have been advocated, and also explains why so many of these remedies have not stood the test of time.

In the therapy of urticaria at Northwestern University it was observed by Rosenberg²⁷ that the use of elimination diets sometimes was associated with exacerbation of the disease. This observation, coupled with the fact that some of the patients had been on relief and some had been on a prolonged diet containing limited amounts of citrus fruits and fresh vegetables, led to a consideration that vitamin C deficiency might be etiologically significant in these cases. Since urticaria is a disease involving the small blood vessels and since vitamin C deficiency is known to be capable of causing a defect in capillaries (Wolbach and Howe²⁸), it seemed logical to study the vitamin C content of the blood in these cases and to test the effect of therapy by means of vitamin C. It was found that the blood vitamin C level was reduced usually about 50 per cent below normal. Also, it was found that the administration of vitamin C in the form of lemon juice and orange juice produced a sharp rise in the blood vitamin C level and relieved wholly or in part the symptoms. The case histories reported are interesting.

Rusk and Kenamore²⁹ have reported a series of 6 cases of urticaria which were resistant to the customary forms of therapy, such as Rowe diets, elimination of foci of infection, and other routine measures. These cases were subsequently managed with surprisingly favorable results by means of a high-protein, low-sodium, acid-ash diet of average

caloric value with potassium chloride added in dosage of 60 to 90 gr. daily. Potassium was administered on the basis of its action as a depressant to skin irritability and of its other effects similar to the action of adrenalin. Cohen³⁰ used the Rusk and Kenamore treatment in 8 cases of urticaria, and none of these showed any improvement whatsoever. Such discrepancies in the results of various forms of therapy, as employed by different workers in different localities, are frequently encountered in all branches of medicine, as is well recognized. It is probable, however, that these discrepancies are particularly noticeable in the many forms of treatment advocated for urticaria.

After having used insulin successfully in certain cases of refractory eczema, Caven³¹ studied its action in 2 cases of severe urticaria. Favorable results were obtained. One patient was found to be sensitive to wheat, eggs and milk, and a restricted diet brought relief, but the slightest dietary indiscretion caused prompt recurrence. Daily injections of 5 units of protamine zinc insulin resulted in an improvement to the extent of permitting the patient to eat bread without distress, whereas previously one slice of bread had caused pain in the abdomen and swelling about the eyes within an hour or so. The second patient developed severe, acute generalized urticaria following a suprapubic cystotomy. The precise cause of this case of urticaria was not identified, and the usual types of treatment brought no relief. Three hours after the injection of 8 units of protamine zinc insulin, all signs of urticaria disappeared promptly. There was a mild recurrence several days later, but this was checked by another injection. After that no further occurrences were observed.

Hajos,³² in a study of chronic urticaria, found that among his patients the gastric hydrochloric acid was absent in 65 per cent and lowered in 30 per cent. Cholecystitis was often present among these patients. In treatment, he employed hydrochloric acid by mouth and histamine injections. Favorable results were obtained.

According to Freund,³³ the only means of relieving immediately the itching of urticaria consists in repeatedly rolling a very hot, uncovered water bottle over the involved area. Wise and Sulzberger³⁴ agree with this general viewpoint and state that the relief of intolerable crises of itching is often best accomplished by the application of heat, such as immersion of the part in water as hot as the skin will bear.

According to Hopkins,³⁵ one should think, in dealing with chronic urticaria, of bacterial sensitization as the likeliest cause, and of allergy to food as the least likely. In some of his cases of in-

tractable urticaria, Traut⁹ found hemolytic streptococci and green streptococci growing in abnormal profusion in the rectum. In the absence of other detectable causes, these patients were treated with vaccines of rectal streptococci, and the results were good. The patients treated successfully by this method had usually received prolonged and fruitless therapy along many of the usual standard lines, such as Rowe diets, avoidance of wool and silk, removal of husband, aunt, daughter and dog, and injections of whole blood and calcium. One patient with chronic urticaria of fourteen years' duration was treated by a series of seventeen injections of streptococcal vaccine and was relieved completely, having had no recurrences in two years at the time the case was reported. From the Mayo Clinic (Emmett and Logan³⁶) a case of chronic urticaria of seventeen years' duration has been reported; this patient was treated and cured by an autogenous vaccine of colonic organisms.

The bacterial origin of urticaria has been studied in an illuminating manner by Hansen-Prüss,³⁷ who has analyzed and reported several cases of great interest. One case of severe urticaria was found to be due to a pyelitis caused by a hemolytic *Staphylococcus aureus*, and cleared when the urine cultures became negative. There was a strong immediate skin reaction to staphylococcal toxoid, and this was found to persist two years after disappearance of the urinary infection. A second case of Hansen-Prüss's showed x-ray evidence of gall-bladder disease, and this led to bacteriologic studies of duodenal-drainage material, which proved to contain hemolytic streptococci. Stool cultures showed hemolytic colon bacilli and beta hemolytic streptococci. This case was treated successfully by Prontylin and Prontosil. The urticaria disappeared, and cultures of the stool and duodenal fluid became negative.

Hansen-Prüss succeeded in demonstrating the presence of beta hemolytic streptococci in the upper respiratory tract, the bronchial tree or duodenal contents of 10 adults suffering from urticaria. Elimination of the infection was followed in every case by subsidence or disappearance of urticaria. Prontylin, Prontosil and sulfanilamide therapy caused the disappearance of beta hemolytic streptococci from the stool and duodenal fluid, but had no effect on alpha hemolytic streptococci.

The use of histaminase in the treatment of urticaria seems to be based on sound physiologic knowledge. Therefore, it has been employed clinically with keen and hopeful anticipation. For many years histaminase has been used in Europe in the form of Torantil in the attempted treatment of all the manifestations of allergy. In reference to

the use of Torantil in this country, Goodman and Sulzberger³⁸ state:

Almost all the investigators now agree that the drug has proved generally disappointing, although its effect may have seemed beneficial in isolated instances. Allergists and dermatologists in this country will watch the results of the next few years work with histaminase with considerable interest. Our own experience with histaminase (Torantil) in all forms of allergy, as well as in urticaria due to cold or other factors, has thus far failed to demonstrate any therapeutic effect.

Markel³⁹ has reported a case of chronic urticaria and angioneurotic edema associated with signs of pancreatic insufficiency. The administration of deinsulinized pancreatic extract resulted in a cure. Although cases of this type must be uncommon, this case serves as an example showing the extremely bizarre etiologic interplay seen in urticaria, and it serves also as one further item which may be added to our therapeutic legerdemain.

The endocrinologic approach to the urticaria problem deserves thoughtful consideration, and further advances in the field of endocrinology may shed valuable light on the problem of therapy. It is well recognized that acute attacks of urticaria may be relieved at least temporarily and partially by injections of adrenalin. Cases of chronic urticaria have been known to respond successfully to thyroid medication, when many other measures had failed. It may be remembered that the drug, thyroid, sensitizes the neuromuscular function to the action of the patient's own circulating adrenalin. Perhaps urticaria is actually a type of imbalance between the two divisions of the autonomic nervous system—sympathetic and parasympathetic. Atropine, ephedrine, pilocarpine and other drugs and the hormones have powers of influencing the autonomic-nervous-system balance. Perhaps a drug or hormone more effective in its influence on the activity of the autonomic nervous system will be found and will be of great value in the symptomatic treatment of hives.

POISON-IVY DERMATITIS

In an entry dated October 9, 1748, Peter Kalm gave in his account of his travels in North America an extensive and interesting description of the *Rhus radicans* of Linnaeus. Since that time there have been many accounts of these plants and of their toxic nature. Even before 1748 there was a clear-cut account of severe suffering from poison-ivy dermatitis, which was contracted in New Mexico by the members of a Spanish expedition, under Governor Valverde, sent to that area in 1719 (McNair⁴⁰).

Of all the skin eruptions caused by plant substances, that produced by the different species of

Rhus is probably the commonest in North America. *R. toxicodendron*, *R. radicans* and *R. diversiloba* form a triad of plants regarded equally with caution and aversion. The recognition of their injurious character is shown in the application of the names, "poison ivy," "poison vine" and "poison oak," given to them in various parts of the United States. Shelmire,⁴¹ commenting on this three-leaved, white-fruited form of the *Rhus* family, makes statements of considerable interest. In addition to the various species of the *Rhus* family already mentioned, he lists *R. quercifolia*, *R. microcarpa* and *R. rydbergii*, and he reasons as follows:

Some botanists still contend that slight differences exist between these many forms, basing their contentions on whether the habit of growth of the plant is chiefly erect or climbing and on variances in the texture, pubescence and degree of lobing of the leaflets. Since all these variations can be observed in the same species under different climatic, soil and other field conditions, conservative taxonomists now agree that the numerous species of poison ivy are identical. I have patch tested ivy-sensitive persons with acetone-diluted oleoresins extracted from the many so-called species of ivy collected in different sections of the United States and have found the antigenic potencies of the various specimens to be identical.

Shelmire's experiments indicate that the dermatitis-producing principle of poison ivy is not an oil, as previously described, but a dialyzable fraction of the oleoresin soluble in water and urine.

Poison-ivy dermatitis is a skin disease that, as a rule, is diagnosed easily, but it cannot be diagnosed with absolute accuracy on the basis of the skin appearance alone. It is advisable always to elicit a careful history to eliminate the other venenatas and contact dermatoses, which present pictures identical with that seen in poison ivy. The dermatoses that may bear a close resemblance include those due to such allergens as the following: iodine, furs, dyes, cosmetics, tar, sulfur, chrysanthemum, primrose, sumac, sunflower, ragweed, celery, tobacco, tomato, orange, matches, phenol, cocobolo wood and formalin. This long list could be extended a great deal further with considerable ease, but it serves as it stands to indicate the numerous pitfalls that easily creep into the diagnosis of poison-ivy dermatitis.

The ease with which this dermatitis is misdiagnosed accounts in part for the widely divergent opinions concerning therapy, particularly injections. It seems likely that many cases treated by injections of the *Rhus* antigen are not really caused by poison ivy but by totally unrelated substances and hence are not likely to respond to ivy-antigen injections.

An acute dermatitis presenting clear-cut vesicles

with or without bullae and appearing suddenly on exposed regions of the body should always arouse suspicion of dermatitis venenata. In the summer months an acute vesicular dermatitis involving the face, hands and genitalia should always call for inquiry concerning ivy, primrose or other plants. In the colder season a similar eruption around the neck suggests investigation of the possibility of allergic reaction to collars and scarves containing fur, wool, silk or dyes. At any season a dermatitis in the scalp, spreading over the forehead, ears and neck, should lead to inquiry regarding hair dyes. These simple facts reviewed even briefly as one inspects and studies a clear case of dermatitis venenata should help to prevent a hasty and erroneous diagnosis of poison-ivy dermatitis.

The distribution of poison-ivy dermatitis need not be limited to hands, face and genitalia, but may involve any area of the body. As a rule, one makes no effort to account for the bizarre areas of distribution that are seen. However, the effort to inquire into and determine possible mechanisms to account for any particular type of distribution may be rewarded by interesting findings concerning this subject. One patient of mine had been exposed quite definitely to poison ivy, but had the disease only on the thighs and buttocks. He recalled no direct contact with the plant except with his gloves and other articles of clothing. On careful questioning it was discovered that after he came in from chopping wood he took off his trousers and laid them on a chair. He then sat down on the trousers as he unlaced and removed his shoes and stockings. The distribution was thus accounted for. In this case, the hands showed no evidence of the disease, although they must have come in contact with the poison ivy on his clothing. The hands escaped the disease in this case probably because they were washed with soap and water before the ivy allergen could initiate dermatitis. As a rule, people wash their hands far more frequently than other parts of the body. In studying the distribution of poison-ivy dermatoses, it should be helpful to remember that even in the most violently susceptible subjects all areas of skin may not be allergic to poison ivy, and that some areas may be quite resistant to it, as proved by patch tests.

Internal manifestations of poison-ivy poisoning may occur. The majority of such cases have been caused by chewing the leaves or by swallowing the juice to obtain immunity. One of these cases terminated fatally (Alumbaugh⁴²). The internal form of the disease sometimes occurs after eating the poison-ivy fruit, particularly if it is unripe. In such cases the patient usually becomes

drowsy and stuporous, later vomits a wine-colored fluid and finally may go into convulsions.

Prophylaxis and Treatment

Protection against poison-ivy dermatitis may be afforded by application of an oxidizing agent to the skin prior to deliberate exposure to the plant. Potassium permanganate solution (0.1 per cent) and ferric chloride solution (3 to 5 per cent) have been found to be useful. The potassium permanganate method, however, has the disadvantage of staining, and the ferric chloride method carries the risk of permanent iron deposits in the skin. Schwartz, Warren and Goldman⁴³ have found that complete protection of the skin against the action of the poison-ivy plant can be accomplished by application to the hands and forearms of a preparation containing 10 per cent sodium perborate incorporated in a base of vanishing cream. After such an application, a white deposit is left on the skin. Poison-ivy leaves may then be plucked and brushed against the skin without deleterious effects. Farmers, horticulturists, gardeners and men engaged in clearing land of poison ivy can obtain complete protection by the use of this cream. Application of the substance should be made in the morning and removed at noon with soap and water, which removes not only the sodium perborate but also the poison-ivy deposits. In the afternoon, when the patient returns to work, the cream should be reapplied.

The problem of the treatment of poison-ivy dermatitis is that of skillful selection and proper application of oxidizing, drying and antipruritic agents. In addition, there is the controversy about whether or not injection of poison-ivy extracts should be employed. Of course, in all cases one must adapt the treatment to the patient's idiosyncrasies. The past experiences of the patient are usually an excellent aid in working out a program of care particularly suited to the individual case.

It seems as though no type of topical application has any consistently dramatic effect in the treatment of poison-ivy dermatitis. In my experience, the dramatic results from therapy have seemed to come mostly from the use of poison-ivy extracts given by intramuscular injection. When such excellent results are obtained, they have come about only after the administration of at least four daily injections of the extract and only after the passage of about twenty-four hours after the fourth injection. I have used Lederle's poison-ivy extract, given in 1-cc. doses by a careful technic devised to ensure deep intramuscular injection and to avoid placing any of the material on the skin or in the subcutaneous spaces. Naturally, if the poison-ivy extract comes in contact with the skin, the usual

dermatitis is likely to result. If the extract is introduced into the subcutaneous spaces or if it leaks back into these spaces from the muscle, severe local reactions are apt to occur. Following intramuscular injection, immunity develops in various degrees. It is well recognized that having had poison-ivy dermatitis provides no immunity, and one attack is apt to be followed by years of recurrent attacks, unless injection therapy is used or unless the plant is avoided. There is no doubt that severe allergy to poison ivy may subside spontaneously, but it is more apt to take place by a very slow and gradual process, probably requiring complete avoidance of the plant for years.

Topical applications of value in the treatment of poison ivy include the following: potassium permanganate solution (0.02 per cent), boric acid solution (2 per cent), Burrough's solution (diluted 1:16) and carbolized zinc oxide lotions. Iron salts such as ferric chloride are no longer recommended because of the permanent iron deposits occasionally seen. In my opinion, the best and safest oxidizing agent is potassium permanganate.

It is of great importance to remember, when treating all types of dermatitis venenata, that the local therapy is exclusively a drying type of procedure and that after several days of such treatment the skin may become excessively dry. At this stage, itching may be due to dryness and not to vesiculation. After the disappearance of vesiculation it is desirable to use a grease, which will often give considerable relief from discomfort. It is contrary to the best accepted opinions to use any kind of grease before the disappearance of vesiculation. The allergen of poison ivy is soluble in oils and greases, and it is possible to disseminate the poison considerably by the premature use of ointments. The use of a grease in the late dry stages of poison-ivy dermatitis is an entirely different matter, as already indicated.

Opinions regarding the injection therapy and prophylaxis of poison-ivy dermatitis are widely divergent. Caulfield,⁴⁴ of Toronto, employed poison-ivy extracts in therapy and prophylaxis and obtained very favorable results. He found that intramuscular injection of this extract lessened the severity and duration of an attack, and he succeeded in showing that after these injections the patch tests with poison-ivy material became less strongly positive or even completely negative. He demonstrated evidence that clinical immunity to ordinary contact with poison ivy could be produced by these injections.

The present status of the therapy and prophylaxis of poison-ivy dermatitis by the injection method has been summarized recently by Good-

man and Sulzberger.³⁸ It is appropriate to quote an excerpt from their paper:

The following are among the authors who have reported favorable results from administration of extracts in the specific treatment of ivy dermatitis. Strickler, Williams and MacGregor, Bivings, Clock, Gowen, Sharlit and Caulfield.

The following are among those who have reported no beneficial effects of extracts used in specific treatment: Krause and Weidman, Corson and Sompeyrac.

Among others, the following have reported the specific extracts to be effective in prophylaxis of poison-ivy dermatitis: Clock, Gowan, Blank and Coca, Biederman, Caulfield, and Molitch and Poliakoff . . .

On the other hand, there are some authors who report that specific injections are of no prophylactic value. These include Bachman, and . . . Zisserman and Birch, with a controlled study on a group of 1731 boys

Wright⁴⁵ states that he has administered the tincture of *R. toxicodendron* by mouth and has obtained with it excellent results both during the attack and, particularly, in the prevention of ivy poisoning. He has described carefully his technic for using the tincture. Wright also recommends the injection therapy of poison ivy.

X-ray therapy is a useful aid in poison-ivy dermatitis and is often employed in severe and stubborn cases. It is effective in dosage so small as to involve no hazard whatsoever.

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REFERENCES

- Walzer, A and Walzer, M Studies in urticaria I Wheal production through internal channels *Am J M Sc* 173 279 284, 1927 II The experimental wheal produced on normal skin through internal channels *Arch Dermat & Syph* 17 659 686 1928 IV Wheal formation on abnormal skins *Ibid* 20 277 302, 1929
- Struss H W Studies in experimental hypersensitiveness in the rhesus monkey II Passive local cutaneous sensitization with human reaginic sera *J Immunol* 32 251 268, 1937
- Sherman W B, Stull A and Hampton, S F Passive sensitization of human skin by serum of experimentally sensitized animals *J Immunol* 36 447 458 1939
- Sulzberger, M B and Goodman, J Allergy in dermatology a critical review of recent contributions *J Allergy* 9 398 423, 1938
- Blum H F and West, R J Studies of an urticarial response to blue and violet light in man *J Clin Investigation* 16 261 277, 1937
- Urbach, E Kritische Uebersicht uber 500 eigene Urtikariafalle (Zu gleich ein Beitrag zum Problem Allergische oder pathergische Urtikaria) *Munchen med Wchnschr* 84 2054 2060 1937
- Winkelwerder W L The relationship of urticaria and angioneurotic edema to general medicine *Pennsylvania M J* 43 1073 1079, 1940
- Ormsby, cited by Traut⁹
- Traut E F Management of intractable urticaria *Arch Dermat & Syph* 40 368 373 1939
- Rove A H Elimination diet in diagnosis and treatment of food allergy *J Am Dietet A* 16 193 198, 1940 *Food Allergy* 442 pp. Philadelphia Lea & Febiger, 1931
- Wise, F and Sulzberger, M B *The 1936 Year Book of Dermatology and Syphilology* 720 pp Chicago Year Book Publishers 1936 P 9
- Wise and Sulzberger¹¹ P 10
- Wise and Sulzberger¹¹ P 11
- Wise and Sulzberger¹¹ P 14
- Wise and Sulzberger¹¹ P 15
- Stokes, J H, Kulchar, G V and Pillsbury, D M Effect on skin of emotional and nervous states etiologic background of urticaria with special reference to psychoneurogenous factor *Arch Dermat & Syph* 31 470 499, 1935
- Stokes J H and Beerman H Effect on skin of emotional and nervous states rosacea complex *Arch Dermat & Syph* 26 478 494 1937
- Rappaport, B Z discussion of Hopkins, J G Urticaria *J Allergy* 11 205 210 1940
- Waldbott, G L and Ascher, M S Urticaria of the serum sickness type report of five cases *J Allergy* 9 584 592, 1938
- Wise, F and Sulzberger, M B *The 1937 Year Book of Dermatology and Syphilology* 736 pp Chicago Year Book Publishers 1937 P 120
- Idem* Urticaria and hay fever due to trichophytin (epidermophy) as interdigitate) *J A M A* 95.1504, 1930
- Sulzberger, M B, Goodman, J, Byrne, L A and Mallozzi E O Acquired specific hypersensitivity to simple chemicals II Cheilitis with special reference to sensitivity to lipstick *Arch Dermat & Syph* 37 597 615, 1938
- Grant, R T, Pearson, R S B and Comeau, W J Observations on urticaria provoked by emotion, by exercise and by warming the body *Clin Sc* 2.253 272 1936
- Duke, W W Physical allergy preliminary report *J A M A* 84 736-740, 1925
- Hopkins, J G, Kesten, B M and Hazel, O G Urticaria provoked by heat or by psychic stimuli *Arch Dermat & Syph* 38 679 691 1938
- Hall, Ettinger and Banting cited by Hopkins, Kesten and Hazel²¹
- Wise and Sulzberger¹¹ P 7
- Rosenberg, W A Vitamin C deficiency as a cause of urticaria *Arch Dermat & Syph* 37 1010 1014, 1938
- Wolbach, S B and Howe, P R Intercellular substances in experimental scorbutus *Arch Path* 1-1 24, 1926
- Rusk, H A and Kenamore, B D Urticaria new therapeutic approach *Ann Int Med* 11-1838 1844, 1938
- Cohen, A E The treatment of chronic urticaria with a high protein low sodium, acid ash diet, with added potassium chloride *J Allergy* 10 61 63, 1938
- Caven, W R Use of insulin in urticaria *Canad M A J* 38 459 1938
- Hijos cited by Wise, F and Sulzberger M B *The 1938 Year Book of Dermatology and Syphilology* 719 pp Chicago Year Book Publishers, 1938 P 151
- Freund, L Zur Aetiology und Therapie der Urtikaria *Wien med Wchnschr* 87 317, 1937
- Wise and Sulzberger¹¹ P 395
- Hopkins J G Role of food allergy in diseases of the skin *New York State J Med* 38 23 28, 1938
- Emmett, J L and Logan, A H Urticaria of seventeen years duration report of a case treated successfully *J A M A* 101 1966 1933
- Hansen Pruss, O C Urticaria of bacterial origin *J Allergy* 9 577 583 1938
- Goodman, J and Sulzberger, M B Allergy in dermatology a critical review of recent contributions *J Allergy* 2 407 426 1940
- Markel, J Chronic relapsing urticaria and angioneurotic edema report of a case with associated pancreatic insufficiency and relief by oral administration of deinsulinized pancreatic extract *Arch Dermat & Syph* 39 992 994 1939
- McNair, J B *Rhus Dermatitis From rhus toxicodendron, radicans and diversiloba Poison Ivy Its pathology and chemotherapy* 298 pp Chicago University of Chicago Press 1923
- Shelmire B Nature of the excitant of poison ivy dermatitis *Arch Dermat & Syph* 42 405 409, 1940
- Alumbaugh, W E cited by McNair⁴⁰ P 133
- Schwartz, L, Warren, L H and Goldman, F H Protective ointment for the prevention of poison ivy dermatitis *Pub Health Rep* 55 1327 1333, 1940
- Caulfield, A H W The specific diagnosis and treatment of poison ivy (*Rhus toxicodendron*) dermatitis *J Allergy* 9 525 544 1938
- Wright, C S *Manual of Dermatology* 376 pp Philadelphia The Blakiston Co, 1940 P 209

CASE RECORDS OF THE
MASSACHUSETTS GENERAL HOSPITALANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27151

PRESENTATION OF CASE

A twenty-nine-year-old married seamstress entered the hospital complaining of attacks of "coma."

The patient was well until three years before admission, when she noticed the onset of dizzy spells occurring about eleven o'clock in the morning during which she felt faint. Further, the patient felt weak and almost continuously hungry. Two and a half years before admission, at the same time one morning, she began to perspire freely, her mind became "paralyzed" and she went into "coma." This state lasted for seven hours, and although friends said that she walked and ate during the first two hours, she remembered nothing. The patient stopped work for five months, but then returned and shortly afterward had another attack of "coma." In the morning two days later, after having some teeth extracted, she could not be roused, so that the family physician advised immediate entry to a hospital, where the patient regained consciousness; a skull plate was negative, but a blood-sugar level of 35 mg. per 100 cc. was recorded. The patient was given "mixed gland pills" and a high-calorie, high-fat diet, with seven meals a day. Under this regime she felt better and gained weight and strength, but her appetite was not easily appeased and she lacked her former energy. The attacks of "coma," although milder, still occurred two or three times a month and seemed to have a relation to menstruation. In general the attacks appeared before mealtime when the patient felt weak and hungry and had worked too hard around the house. The spells were ushered in by marked perspiration, dizziness and lack of concentration, but they occasionally appeared without warning; sometimes she could hear, but was unable to respond or complete an intended action. Loss of consciousness could be prevented by drinking cocoa or coffee with sugar, and after such an attack she felt chilly. The patient had gained 40 pounds in the last two and a half years.

The family history was irrelevant. The patient had one child, born a few months before the onset of her present illness.

Physical examination was essentially negative. The blood pressure was 110 systolic, 70 diastolic.

The temperature, pulse and respirations were normal.

The urine was normal. Examination of the blood showed a red-cell count of 4,940,000 with a hemoglobin of 90 per cent, and a white-cell count of 10,500. The fasting blood sugar ranged between 38 and 41 mg. per 100 cc., the nonprotein nitrogen was 24 mg., the protein 6.4 gm. and the cholesterol 144 mg. per 100 cc., and the chlorides 103.1 milliequiv. and the carbon dioxide combining power 28.7 milliequiv. per liter. A blood Hinton reaction was negative; the stools were normal. A glucose-tolerance test using 100 gm. of glucose gave a fasting sugar of 26 mg. per 100 cc., 102 mg. in thirty minutes, 196 mg. in one hour, 220 mg. in two hours and 246 mg. in three hours. An insulin-glucose-tolerance test using 6 units of insulin subcutaneously and 100 gm. of glucose by mouth gave a fasting sugar of 30 mg. per 100 cc., 89 mg. in twenty minutes, 102 mg. in thirty minutes, 93 mg. in forty-five minutes, 74 mg. in one hour. At the two-hour mark, when the blood sugar was 90 mg. per 100 cc., 0.6 cc. of adrenalin was given subcutaneously. Forty-five minutes later the sugar was 93 mg., and one hour later 114 mg. A 17-ketosteroid assay was 9 mg. per 100 cc.; the basal metabolic rate was -6 per cent.

X-ray studies of the skull and chest and a gastrointestinal series were negative.

DIFFERENTIAL DIAGNOSIS

DR. REED HARWOOD: There can be no doubt that this woman was suffering from hypoglycemia. The symptoms are typical and were relieved by the ingestion of food. The most probable cause is hyperinsulinism, but we must first consider other possibilities in the differential diagnosis. Addison's disease can be accompanied by hypoglycemic attacks. We can exclude that diagnosis in this case by the physical examination and the normal 17-ketosteroid assay. In hypopituitarism, hypoglycemic attacks are frequent and troublesome, but again we have a physical examination that would exclude it, not to mention the normal menstrual periods and the normal 17-ketosteroid assay. Hypothyroidism in certain liver diseases can cause a tendency toward hypoglycemia, but rarely would a patient have such a low blood-sugar level as is present in this case.

Let us imagine that we are the physician in charge and that we must decide what to do with this patient. She was in an extremely precarious situation. Although the attacks had been fairly well controlled in the past, there was no telling

when she might be unable to absorb enough glucose because of gastroenteritis, seasickness or anything of the sort. There is no way of telling when she might overexert herself or for some reason be unable to get food quickly. She might suffer serious cerebral damage or die in an attack. It was therefore necessary to explore the pancreas in the hope of finding a tumor of the islands of Langerhans. Since we know that some of these tumors become malignant, we have a second reason for exploration.

Will the surgeon find a tumor? In a good proportion of the reported cases the surgeon has been unable to find one. In some cases a single small nodule or several small nodules are found. Occasionally a single large tumor of the pancreas is found and sometimes extensive metastatic cancer with metastases in the liver. I do not believe that cancer was present in this case, since the symptoms did not progress during the three years. If the surgeon is unable to find a tumor he may elect to resect a good portion of the pancreas in the hope of alleviating the attacks. If this were done, Dr. Mallory may tell us that the pancreatic islet tissue shows hyperplasia, but cases have been reported in which no abnormality was noted in the pancreas. Some patients have been operated on repeatedly; sometimes at a second or third operation a tumor is found, and sometimes one is never found. It is impossible to predict, with the findings that we have, what would be found at operation. Since the gastrointestinal x-ray films were normal, I am going to guess that the tumor was not a large one.

I might say a word about the glucose-tolerance and glucose-insulin-tolerance tests, which have not been found helpful in establishing a diagnosis in these cases. In hyperinsulinism, any type of curve may be found. In this particular case the glucose-tolerance test showed that the patient's own pancreatic tissue was unable to handle a large test dose of glucose. This can mean that the patient had diabetes mellitus as well as hyperinsulinism,—such cases have been reported,—or it can be explained on another basis. In the presence of an islet tumor, the normal islet tissue may not be functioning properly. The glucose-insulin-tolerance test simply showed that the patient was not insulin resistant. The most significant test in hyperinsulinism is the fasting blood sugar.

CLINICAL DIAGNOSIS

Islet tumor of pancreas.

DR. HARWOOD'S DIAGNOSES

Hyperinsulinism.

Adenoma of the islands of Langerhans ?

ANATOMICAL DIAGNOSIS

Adenoma of pancreatic islet cells.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: This patient was explored by Dr. Leland S. McKittrick and Dr. Edward D. Churchill, with a diagnosis of probable islet tumor of the pancreas. After a very long tedious exploration, almost given up at one point, a small area of the pancreas was finally found that seemed to be of slightly different color and consistence from the rest. It was outlined so vaguely that they were uncertain where the borderline was between the tumor and the surrounding pancreatic tissue. Therefore, a margin of presumably normal pancreas was resected with the suspected tumor. The specimen was immediately divided in half, part of it delivered to the chemists for insulin assay, and the other half run through for sections. Unfortunately, it was still impossible to be certain what was tumor, and the specimen that was sent for assay turned out to be normal pancreas, showing a normal insulin content. The material we saved for histologic examination we again divided in two parts, one of which we put in ordinary fixative, the other in a special fixative, thinking we would try to stain the beta granules. The part we put in special fixative turned out to be normal pancreas, showing beautiful granules in the islets. The part we put in the ordinary fixative did prove to be an adenoma, but all our efforts at special investigation were fruitless. Further proof that this was an islet tumor of the pancreas is furnished by the postoperative course of the patient.

DR. EUGENE SULLIVAN: She has been followed carefully since her operation in October, and was last seen one month ago. We were somewhat disturbed immediately postoperatively that one or two blood-sugar determinations were rather low. However one of these specimens had apparently clotted by the time it got to the laboratory. The recent specimens show a fasting blood-sugar range of 70 to 80 mg. per 100 cc. in comparison with the ones taken beforehand, which were in the neighborhood of 40 mg. She has not had a single hypoglycemic attack since operation.

CASE 27152

PRESENTATION OF CASE

A forty-three-year-old woman entered the hospital complaining of shooting pains in the right leg. The patient stated that approximately three years before admission she tripped on the stairs

and fell on her right knee and shin, scraping the skin rather badly. Since that time she had been unable to kneel on that knee and had had intermittent, mild pain in the upper right leg aggravated by walking. One month before admission the pain in the upper shin became much worse and often kept her awake. During the year before entry, the patient had gained 20 pounds and had suffered from frequent frontal headaches, and for six months, vision had failed gradually in her left eye.

The patient had had diphtheria and tonsillitis. She was the mother of ten children, and had had one abortion, and two premature births occurring at seven months, neither of the infants surviving.

On examination the patient was well developed and well nourished and in no apparent distress. The scleras were clear; the pupils were equal and regular, and reacted to light and accommodation. A rosebud-shaped posterior polar cataract was present in the left eye. Examination of the heart, lungs and abdomen was negative; the blood pressure was 110 systolic, 70 diastolic. Rectal examination showed hemorrhoids and a slight rectocele. There was a fusiform, tender swelling of the upper third of the right tibia along its anterior border. The skin over this swelling showed a brownish pigmentation; the temperature was not increased. Arterial pulsations were present in both legs. Examination of the nervous system was negative.

The temperature, pulse and respirations were normal.

Examination of the urine showed a + test for albumin; Bence-Jones protein could not be demonstrated. Examination of the blood showed a red-cell count of 4,350,000 with a hemoglobin of 75 per cent, and a white-cell count of 5700 with 65 per cent polymorphonuclears. The sedimentation rate was 28 mm. in one hour. The nonprotein nitrogen of the blood serum was 20 mg., the calcium 10.6 mg., the phosphorus 3.5 mg. and the phosphatase 2.6 Bodansky units per 100 cc. Blood Hinton and Wassermann reactions were positive; agglutination reactions against typhoid and paratyphoid bacilli and *Brucella abortus* were negative. A lumbar puncture gave an initial pressure of 150 mm. of spinal fluid. On examination of the fluid there was no increase in cells; the protein was 75 mg. per 100 cc., the gold-sol curve 2223331000, and the Wassermann reaction positive.

X-ray films of the right leg taken in the Out Patient Department one month before admission showed extensive, irregular periosteal new-bone formation along the anterior and lateral aspects of the right tibia. The changes were particularly marked below the tibial tuberosity. An area of localized bone destruction was also present in this region, and there was some soft-tissue swelling.

An x-ray film of this region at the time of admission showed a definite increase in the periosteal proliferation over the upper end of the tibia. The entire upper third was involved up to the margin of the joint cartilage. There was apparent fluid in the knee joint, and edema of the soft tissues overlying the periostitis. There were still no large areas of bone destruction and no sequestra. The left tibia appeared normal. X-ray studies of the skull, ribs and bones of the pelvis were not abnormal. A chest plate was negative, with no evidence of metastases.

On the fourth hospital day a biopsy was performed.

DIFFERENTIAL DIAGNOSIS

DR. CLIFFORD C. FRANSEEN: May we see the x-ray films?

DR. GEORGE W. HOLMES: The location of the lesion is where we should expect to find syphilitic periostitis. The whole cortex is thickened. The endosteum is somewhat thickened, as well as the periosteum, so that the medullary canal is narrow. That again is in favor of a syphilitic lesion. If we look carefully at the lesion itself, the new-bone proliferation has the looped appearance, sometimes called a "lacework appearance," that we associate with syphilis. If we confine ourselves to these earlier films, the lesion is rather characteristic of syphilis, but in the next set of films, taken a month later, a remarkable change has taken place for a syphilitic process that is not under treatment. Then in this film there are some lines that might represent true spicules. Any chronic inflammatory condition could produce that effect, but syphilis does it more often. I think it is very unusual to see it in tumors. A tumor of that extent should be accompanied by a large soft-tissue mass, particularly since it involves the surface of the bone.

DR. FRANSEEN: To go back to the duration, which is of great interest in this case, three years certainly suggests a low-grade, long-standing inflammatory process. The duration is also consistent with a benign lesion in which some change had taken place a month or so before admission, because the pain had become worse during the past month. The failing vision is later explained by the presence of a cataract. I do not know why a patient of this age had a cataract. I do not believe that we have to consider a metastatic melanoma from a primary tumor of the eye in this case, as the history of unilateral failing vision might have suggested. In the approximately 20 cases of this condition that I have seen at the Huntington and Palmer hospitals, I do not remember any in which there was metastasis to bone, but it does occur when the primary tumor is in other sites.

The next points of interest are the two premature births and the positive laboratory findings that have to do with syphilis. The brownish pigmentation could be explained on the basis of longstanding chronic inflammation and need not be related to the brownish pigmentation of von Recklinghausen's disease, which might be suggested because of accompanying bone lesions. The sedimentation rate is barely elevated. The other blood findings are normal. The phosphatase is low, which is against osteogenic sarcoma with this much proliferative new bone present. With the phosphatase normal, the indication is that this new bone has been laid down over a long period of time. The normal phosphatase is also against Paget's disease. When new-bone formation occurs to this extent in metastatic carcinoma, the phosphatase might well be slightly elevated and would almost certainly be elevated to some extent with additional metastasis elsewhere. Both the Hinton and Wassermann reactions were positive, and this again focuses our attention on syphilis. It is difficult to explain why tests for agglutinins against typhoid and paratyphoid bacilli and *Brucella abortus* were performed. The patient had a low white-cell count, it is true. Periostitis does occur in typhoid fever, and I have been told that it also occurs in paratyphoid A fever, so that these tests may not have been so far afield as one would at first imagine. I remember reading of a case of periostitis of the rib in a patient who had typhoid eighteen years previously; a pure culture of typhoid bacilli was obtained from an abscess beneath the periosteum. I do not know that periostitis ever occurs in brucellosis. The lumbar puncture showed findings consistent with tabes: elevated protein, suggestive gold-sol curve and positive Wassermann reaction. The patient had no Argyll-Robertson pupils, however. So much for what we learn by the history and physical findings.

We must also consider other infectious conditions. I think that tuberculosis can probably be ruled out because of the age of the patient and other factors. A low-grade osteomyelitis might be considered. The descriptions of the sclerosing forms of osteomyelitis simulate this picture to some extent, but I have not known of a case of as long duration as this, so that perhaps we need not enlist that diagnosis. Syphilis certainly must be kept in mind, since this lesion, which Dr. Holmes has described, is entirely consistent with syphilitic periostitis. Dr. Holmes and Dr. James R. Lingley described the bone lesions in syphilis three years ago; they suggested that syphilis can simulate practically any bone lesion one can name, and also that it not infrequently follows trauma.

This is also the site in which syphilis of the bone commonly occurs.

So far as neoplasms go, osteogenic sarcoma might be possible from the x-ray examination, but we cannot reconcile it with the duration, the absence of soft-tissue tumor swelling and other factors. The same thing is true of fibrosarcoma contiguous to bone, with periosteal reaction. Ewing's tumor similarly tends to form more of a tumor. It is difficult to make a diagnosis of a malignant bone lesion with a duration of three years, if we can believe that the patient had some process there during the entire period. There is nothing to support myeloma or lymphoma of bone or reticulum-cell sarcoma. She was in the age group in which metastatic cancer might be considered, without lesions elsewhere, but this would be an extraordinary picture for metastatic carcinoma. I remember, however, a patient who had a single metastatic lesion in the tibia, — more destructive than this, it is true, — which was the only lesion in her body of a recurrence of a carcinoma of the breast.

We must keep in mind metabolic diseases, but we have no evidence of anything in the laboratory findings to support such a diagnosis.

We are led so completely to the diagnosis of syphilis of bone that I fear there may be some trap, yet I do not believe we can justifiably make any other diagnosis in view of the x-ray findings, the history and the positive laboratory findings. Despite the diagnosis, I believe a biopsy is indicated for confirmation because of the rapid change in the appearance of the lesion by x-ray examination during the last month. My diagnosis is syphilis of bone.

CLINICAL DIAGNOSIS

Syphilis of bone.

DR. FRANSEEN'S DIAGNOSIS

Syphilis of bone.

ANATOMICAL DIAGNOSIS

Syphilitic periostitis.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: A biopsy of the tibial cortex was performed, and the microscopic examination showed new-bone formation, with marked fibrosis and inflammatory reaction. In the inflammatory tissue, leukocytes and plasma cells predominated, but there were also focal clusters of epithelioid cells that were fairly characteristic of miliary gummas, so that the diagnosis of syphilis is substantiated.

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal
Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of
THE MASSACHUSETTS MEDICAL SOCIETY
and
THE NEW HAMPSHIRE MEDICAL SOCIETY

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SUBSCRIPTION TERMS. \$6.00 per year in advance, postage paid, for the United States, Canada, \$7.04 per year, Boston funds, \$8.52 per year for all foreign countries belonging to the Postal Union.

MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

AMERICAN COLLEGE OF PHYSICIANS

DURING the week commencing April 21, the twenty-fifth annual session of the American College of Physicians will be held in Boston, with general headquarters at the Hotel Statler.

In general the program is as follows: hospital clinics and lectures in the mornings, followed by panel discussions; general sessions in the afternoons; and a variety of entertainment in the evenings, including a Symphony Concert on Tuesday, April 22, and the annual banquet on Thursday, April 24. Detailed information can be obtained from Dr. William B. Breed, 264 Beacon Street, Boston, chairman of the Committee on Arrangements.

Registration is not limited to members of the

American College of Physicians. The following will be admitted without registration fee to practically all the sessions on the presentation of proper credentials at the registration desk: all members of the medical corps of the United States Army, Navy and Public Health Service; members of the staff, including interns, of the hospitals participating in the program; and all fourth-year students of approved medical schools. Furthermore, duly qualified physicians are permitted to register as visitors; this entails a fee of \$12.00, and entitles the registrant to one year's subscription to the *Annals of Internal Medicine*, the official organ of the college.

The Massachusetts Medical Society and the *Journal* extend a hearty welcome to the members of the American College of Physicians, and trust that the success of the meeting will be such that an early return to New England will be guaranteed.

WHY THE MARRIAGE PROTECTION BILL?

House Bill 469 has passed the Committee on Public Health of the Legislature and soon will be reported for action to the House of Representatives. This bill provides that a couple before applying for a marriage license shall consult a physician, who shall make physical examinations and shall take specimens of blood for serologic tests. He must then sign a certificate that he has completed these examinations, and must further communicate his findings to both parties. Thereafter he may treat or deal with the situation privately, according to his best judgment. There is no publicity.

This is a constructive measure that puts squarely on the shoulders of the family physician the responsibility for premarital examination and advice. The traditional patient-physician relation is not violated.

Since the recognition of insanity, tuberculosis, hereditary and many other diseases is as important as that of the widely advertised genito-infectious diseases, the incidence of which seems

to have been much overstated, the thorough examination suggested by this bill is commendable medical practice and should in no case be slighted. The passage of the bill is therefore recommended.

OBITUARY

JOHN PRESTON SUTHERLAND

1854-1941

In the night of February 22, John Preston Sutherland passed peacefully and quickly from this sphere of human endeavor into the fuller life of the Great Beyond. Born in Charlestown, Massachusetts, on February 9, 1854, he inherited from his Scottish ancestry those qualities of mental acumen and physical vigor that made it possible for him to endure the stresses of a crowded and accomplishing life well beyond the scriptural three-score years and ten. Although advancing age had necessitated some curtailment of his activities, he remained young in spirit, and had been able to attend patients in his office the day preceding his death.

The brief space available for this sketch makes it possible to consider in a cursory manner only a few of the outstanding characteristics of this truly remarkable man. And primarily we think of him as the physician. Dr. Sutherland graduated from Boston University School of Medicine in 1879 and immediately opened an office in Concord. In 1881 he moved into Boston, and had constantly practiced there since that time. He rapidly developed a large clientele, numbering among his patients many people of prominence. His conscientiousness and painstaking thoroughness soon resulted in his recognition as a physician of exceptional skill; and his kindly and sympathetic manner endeared him to his patients, and gained lasting friendships and loyalties. His colleagues in the profession acknowledged him to be a keen diagnostician and successful prescriber, and he came to be in wide demand as a consultant, making journeys to all parts of New England. He was a firm believer in the homeopathic principle of drug therapy. He served many years as a visiting physician in the Massachusetts Homeopathic Hospital and was a trustee of the hospital. He also served as a consulting physician on the staffs of several other institutions.

As a teacher and educator Dr. Sutherland was peculiarly gifted. His analytical mind and attention to details, his orderly and logical presentation of his subject matter, and his enthusiastic and convincing manner stimulated in his students an ambition to become proficient in the subjects that

he taught. His first appointment in Boston University School of Medicine was in 1881, as an assistant in clinical medicine; but his advance was rapid until, in 1888, he was elected professor of anatomy, a position that he held until 1907. He served as professor of theory and practice from that date until 1937, when he became professor of medicine, a position that he held at the time of his death.

Another of Dr. Sutherland's prominent characteristics was his executive and administrative ability, which was early recognized by his associates in the faculty of the medical school and resulted in his appointment as registrar in 1896, and acting dean in 1898. He was elected dean in 1900 and held this office until 1923, when he became dean emeritus. His conduct of the affairs of the school was distinguished by impartiality, skillful handling of men and conditions, and courageous and optimistic dealing with difficult situations. His ability to carry out his policies without arousing lasting antagonisms brought the school through many trying periods. These qualities were generally recognized and appreciated. He served as president of several local, state, national and international organizations, and occupied many positions of trust and responsibility in various fields of endeavor.

Dr. Sutherland was a prolific writer and produced innumerable papers on medical and scientific subjects, which were presented at professional gatherings both in this country and abroad. Many of them appeared in regular publications or in the form of brochures. For fourteen years he was the editor of the *New England Medical Gazette*, and during several years was on the editorial staff of the *New England Journal of Medicine*. In 1937 he completed a book that was published under the title, *Malnutrition: The medical octopus*, detailing his observations and conclusions based on the result of many years of study and experimentation with foods in their relation to health and disease.

Dr. Sutherland was a warm-hearted, self-sacrificing, cultured "gentleman of the old school," one of "God's noblemen." No student ever appealed to him for advice or assistance in vain; no colleague ever failed to receive co-operation and help in response to a request; no worthy cause was ever presented to which he did not give careful consideration and appropriate response. His high ideals and noble purposes have profoundly influenced the lives and actions of many of his students and associates. He disliked artificiality and grossness in persons or material things, and was an ardent lover of nature in all its manifestations. Extensively traveled, widely read and intensely interested in and conversant with a variety

of subjects, he was truly "a man of sovereign parts"

Many honors came to Dr Sutherland in the forms of elevation to high office, appointment to positions of trust, resolutions, memorials and gifts, but there are two which deserve especial mention. In 1923 the Trustees of Boston University conferred on him the honorary degree of Doctor of Science, and in 1937 the alumni of Boston University School of Medicine presented to the school a bronze bas relief, which was placed upon the entrance wall as a permanent memorial of the completion of over fifty years of service by Dr Sutherland to his alma mater. The plaque displays a fine portrait of him, with a suitable inscription concluding in the following words "Presented by his students as a tribute to an alert observer, a skillful teacher and an understanding friend"

Dr Sutherland held strong religious convictions, with an unflinching belief in the influence of a Supreme Being on human activities, and the expanding opportunities for service in a future life. The following poem by Walter Clarke Rodman, entitled, "Adventure," of which Dr Sutherland was very fond and which was read at the largely attended and impressive funeral services, seems fittingly to express his creed

To live, to love, to die, to live again,
This is the all of being, but how large
Looms that adventure in the afterward!

Nor life, nor love may here survive, but there
Shall both endure, nor by endurance lose
Their zest. New opportunities for use,
New scenes, new joys, a sense of gratitude
For things mysterious made manifest
Shall there be mine, and not a thought intrude
Regretful of the past. My soul awaits
Expectant the transition Do I hear
The plash of Charon's oars?

Ho! Ferryman

Thus say!

W T L

MEDICAL EPONYM

HEGAR'S SIGN

"Ein neues sicherendiagnostisches Zeichen der Schwangerschaft in den ersten Monaten [A New Infalible Diagnostic Sign of Pregnancy in the Early Months]" was described by C Reinl, of Franzensbad, in the *Prager medicinische Wochen schrift* (9 253, 1884) as a contribution from the clinic of Alfred Hegar (1830-1904) at Freiburg. A portion of the translation follows

During the course of the past winter the opportunity was afforded me, at the gynecologic clinic of Herr

Geheimrat Hegar, of acquainting myself with an excellent new sign of pregnancy in the first months

This consists in the demonstration of an unusual softness, pliability and thinning of the lower uterine segment, that is, the portion immediately above the insertion of the sacrouterine ligaments

This condition of the parts mentioned is not only demonstrable if the remainder of the fundus, as is not at all uncommon, feels firm and hard, but also when it is soft and elastic

The pliability and flabbiness of these parts may be so marked as to cause one to doubt whether there is any connection between the cervix and the larger swelling in the abdomen or pelvis

R W B

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., Secretary
330 Dartmouth Street
Boston

HEART DISEASE IN PREGNANCY WITH FATAL OUTCOME

A thirty six year-old primipara was seen early in pregnancy by her doctor

The past history included rheumatic fever ten years previously, with ensuing rheumatic heart disease. Five years later, the patient suffered from cardiac decompensation

At the time of the first visit, examination showed that she had mitral stenosis and aortic stenosis and insufficiency. The patient was told very plainly the probable outcome of her case if she continued with the pregnancy, but she insisted that it should not be interrupted

The pregnancy progressed fairly well, with the aid of digitalis and rest, until the patient was between five and six months pregnant. At this time the heart became decompensated, and a cardiologist was called in consultation. He referred her immediately to the hospital. She was placed in an oxygen tent and was given cardiac stimulants, including digitalis. She seemed to respond slightly, but suddenly developed marked pulmonary edema and died undelivered fifteen days after admission. It was thought that the terminal event might have been due to a pulmonary embolus. Permission for an autopsy was refused

Comment This is another case procured from the Maternal Mortality Study, a fact which explains the absence of the specific details concern

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section

ing the heart that would naturally have been available in a private case. It illustrates how serious Grade A heart disease may be when complicated with pregnancy. This patient should never have been allowed to become pregnant. In the presence of pregnancy, provided one were thinking only of the medical side, therapeutic abortion should have been performed; this advice was given, but the patient refused to accept it.

The case was not too well handled from the start, since no cardiologist saw the patient until shortly before death. All such cardiac patients when pregnant should be under the care of a skilled cardiologist. This patient should have been in bed constantly. The case proves that organic heart disease is an extremely serious complication in pregnancy.

COMMITTEE ON STATE AND NATIONAL LEGISLATION

The following committee action has been taken on bills in which the Massachusetts Medical Society is interested:

FAVORED BILLS

H. 122. Bill (accompanying House 120, recommendations of the Department of Public Health) relative to requiring the clerk or registrar of each city or town to give to persons who file notice of intention of marriage suitable information concerning gonorrhea and syphilis. Referred to next General Court.

H. 130. Bill (accompanying House 120, recommendations of the Department of Public Health) relative to the sale of barbituric acid, its derivatives and certain other sedatives. Referred to next General Court.

H. 460. Petition of Leslie B. Cutler for legislation to regulate further the filing of notices of intention of marriage, the delivery of certificates of such intention and the return of unused certificates. Reported favorably.

OPPOSED BILLS

S. 502. Petition of Joseph C. Basso for legislation to provide for the regulation of the practice of osteopathy and for the establishment of a state board of osteopathic examination and registration. Withdrawn by petitioner.

S. 560. Petition of Bertram A. Harris and others for legislation relative to the qualifications of applicants for registration as qualified physicians and examinations thereof. Given leave to withdraw.

S. 623. Same as H. 609. Rejected in Senate.

H. 114. Bill (accompanying House 113, recommendations of the Board of Registration in Medicine) relative to providing for the annual registration of physicians and the biennial publication of the list of physicians duly registered. Reported favorably to Committee on Ways and Means.

H. 115. Bill (accompanying House 113, recommendations of the Board of Registration in Medicine) relative to the recording of the certificate of registration of a qualified physician by the town clerk. Reported favorably to Committee on Ways and Means.

H. 116. Bill (accompanying House 113, recommendations of the Board of Registration in Medicine) relative

to establishing a special commission to investigate and study the advisability and practicability of requiring special qualifications of all physicians who engage in the practice of surgery. Withdrawn by petitioner.

H. 272. Petition of Harold W. Sullivan that there be appropriated from the treasury of the Commonwealth the sum of twenty-five thousand dollars to provide for an investigation by the Board of Registration in Medicine relative to the practice of medicine. Given leave to withdraw.

H. 609. Petition of Annic D. Brown for legislation to provide further for regulating the practice of physicians and surgeons. Senate substituted S. 623.

H. 610. Petition of Annie D. Brown for amendment of the law regulating the practice of physicians and surgeons in certain cases. Given leave to withdraw.

H. 1618. Petition of D. N. Potter and others that certificates of vaccination or nonvaccination shall no longer be required as a prerequisite to attendance in the public schools or other institutions of the Commonwealth. Given leave to withdraw.

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning April 13:

BERKSHIRE

Thursday, April 17, at 4:30 p.m., in the Bishop Memorial Building, Pittsfield. Management of Abdominal Distention. Instructor: Hollis L. Albright. Harry G. Mellen, *Chairman*.

BRISTOL SOUTH (Fall River Section)

Tuesday, April 15, at 4:30 p.m., at the Union Hospital, Fall River. Chemotherapy in the Treatment of Gonococcal Infection. Instructor: P. N. Papas. Howard P. Sawyer, *Chairman*.

FRANKLIN

Thursday, April 17, at 8:00 p.m., in the Library of the Franklin County Public Hospital, Greenfield. Dermatitis and Eczema. Instructor: Leonard E. Anderson. Halbert G. Stetson, *Chairman*.

HAMPDEN

Wednesday, April 16, at 4:00 p.m., at the Academy of Medicine, Professional Building, 20 Maple Street, Springfield, and at 8:00 p.m., in the Outpatient Department of the Skinner Clinic, Holyoke Hospital, Holyoke. Technic and Treatment of Primary, Secondary and Tertiary Syphilis. Instructor: Rudolph Jacoby. Alfonso A. Palermo, *Chairman*.

HAMPSHIRE

Thursday, April 17, at 4:15 p.m., in the Nurses' Home of the Cooley Dickinson Hospital, Northampton. Nutritional Deficiencies and the Uses of Preparations of Vitamins. Instructor: Maurice B. Strauss. Robert C. Byrne, *Chairman*.

WORCESTER

Tuesday, April 15, at 8:30 p.m., in the Nurses' Home of the Milford Hospital, Milford. Recent Advances in Medical Therapeutics. Instructor: Charles L. Short. Joseph Ashkins, *Chairman*.

WORCESTER NORTH

Friday, April 18, at 4 30 p m, in the Nurses' Home
of the Burbank Hospital, Fitchburg Pediatric
Case Discussions Instructor Lewis W Hill
George P Keaveny, *Chairman*

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1938

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BUTTERFIELD, PAUL M, Harwich Center
Yale University School of Medicine, 1908
DENTON, JOSEPH H, JR, 59 Locust Street, Falmouth
Long Island College of Medicine, 1938
ROBINSON, JOSEPH, 25 Barnstable Road, Hyannis
Middlesex University School of Medicine, 1933
SOBEL, HARRY, 55 Winter Street, Hyannis
Middlesex University School of Medicine, 1933

Donald E Higgins, *Secretary*

BERKSHIRE DISTRICT

MAGNET, ISAAC H, 44 Main Street, Lee.
Tufts College Medical School, 1937
MARNELL, T FRANK, 312 Main Street, Great Barrington
Missouri College of Medicine and Science, 1927

George S Reynolds, *Secretary*

BRISTOL SOUTH DISTRICT

GOULSTON, HAROLD F, 214 Mt Pleasant Street New
Bedford
Tufts College Medical School, 1940
WARBURTON, NORMAN W, 189 Bates Street, New Bedford
Philadelphia College of Osteopathy, 1931
Middlesex University School of Medicine, 1935

Albert H Sterns, *Secretary*

ESSEX NORTH DISTRICT

JESSNER LUCIE J N, Baldpate, Georgetown
University of Konigsberg, 1927

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University of Freiburg 1935
NUSSBAUM JULIUS, 279 Summer Street, Lynn
University of Vienna, 1925

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FRANKLIN DISTRICT

ANDER, ERIC D, 26 Congress Street, Greenfield
University of Heidelberg 1914
LANE VIRGINIA E, Northfield Seminary, East Northfield
Women's Medical College of Pennsylvania 1928

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ALLAN, MALCOLM S, 19 Maple Street, Palmer
Tufts College Medical School, 1938
BILSKI, THEODORE, 12 Pleasant Street, Westfield
University of Halle, 1922
BLAKER, SAMUEL I, 262 Riverdale Road, West Spring
field
Middlesex University School of Medicine, 1926
CARY, FRANCIS F, Springfield Hospital, Springfield.
Harvard Medical School, 1938
CLEVELAND, HAROLD F, 462 Belmont Avenue, Spring
field
Middlesex University School of Medicine, 1920
GINSBURG, DAVID, 505 Armory Street, Springfield
Midwest Medical College, 1934
JORCZAK, JOHN S, 250 School Street, Chicopee
College of Physicians and Surgeons, Boston, 1931
KAHN, TRUDE, 319 State Street, Springfield
Bonn University, 1935
KLAR, JACOB J, 124 Ellsworth Avenue, Springfield
College of Physicians and Surgeons, Boston, 1934
MAZZOLINI, ANDREW, 274 Maple Street, Holyoke
Middlesex University School of Medicine, 1934
MEMERY, HARRY N, 117 Longmeadow Street, Long-
meadow
Tufts College Medical School, 1939
NATHAN, PAUL, 249 Maple Street, Holyoke
University of Freiburg, 1923
SCHWARTZ, LEO, 110 West Alford Street, Springfield
Middlesex University School of Medicine, 1934
SMITH, LEONARD, 43 Court Street, Westfield
Middlesex University School of Medicine, 1930
VARTANIAN, NEVARD S, 16 Whitney Street, Ludlow
Middlesex University School of Medicine, 1929
Wayne C Barnes, *Secretary*

HAMPSHIRE DISTRICT

BRICK, EDWARD J, 66 Roe Avenue, Northampton
Middlesex University School of Medicine, 1934
DOYLE, BERNARD J, 59 Union Street, Easthampton
Tufts College Medical School, 1939
HASKELL, HELEN S, 18 Henshaw Avenue, Northampton
Cornell University Medical College, 1938
KRANICHUCK, JOHN M, 81 Bardwell Street, South Had
ley Falls
Tufts College Medical School, 1933
SHERIDAN PHILIP H, 16 Center Street, Northampton
McGill University Faculty of Medicine, 1938

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FISHER, PAUL L, New England Sanitarium and Hospi
tal Melrose
College of Medical Evangelists, 1936
MORELLI DARIO 17 Richardson Avenue, Wakefield
Royal University of Naples Faculty of Medicine, 1932
PROCHNIK, JAMES J 19 Yale Avenue, Wakefield
University of Vienna, 1919

WHITE, ROLAND H., New England Sanitarium and Hospital, Melrose.

College of Medical Evangelists, 1935.

Kenneth L. MacLachlan, *Secretary*.

MIDDLESEX NORTH DISTRICT

ABRAMS, HERBERT, 10 Staples Street, Lowell.
Tufts College Medical School, 1938.

D'ARTUN, BARON A., 91 Third Street, Lowell.
Faculty of Medicine in Lausanne, 1919.

LANDAU, IRVING I., Boston Road, Pinehurst.
University of Berlin, 1934.

YAVAROW, MILLIN M., St. John's Hospital, Lowell.
Tufts College Medical School, 1939.

Raoul L. Drapeau, *Secretary*.

MIDDLESEX SOUTH DISTRICT

AVALLONE, LOUIS J., 476 Broadway, Somerville.
Middlesex University School of Medicine, 1933.

BELL, GEORGE O., 5 Jaffrey Circle, Waban.
Harvard Medical School, 1934.

BERGMANN, LOUIS, 30 Chiswick Road, Brighton.
University of Vienna, 1932.

BERL, ADOLF, 1875 Commonwealth Avenue, Brighton.
University of Leipzig, 1926.

BLOOMENTHAL, ABRAHAM P., 5 Banks Street, Waltham.
Middlesex University School of Medicine, 1934.

BRUGSCH, HEINRICH G., 6 Spinney Terrace, Belmont.
University of Berlin, 1927.

CAHILL, FRANCIS P., 25 Haskell Street, Cambridge.
Harvard Medical School, 1938.

DEUTSCH, HELENE, 44 Larchwood Drive, Cambridge.
University of Vienna, 1913.

DICK, VERNON S., 17 Stetson Way, Waban.
University of Michigan Medical School, 1933.

EVANS, JAMES A., 137 Dorset Road, Waban.
Harvard Medical School, 1920.

FISCHMANN, 90 Kilsyth Road, Brighton.
University of Berlin, 1926.

FISK, EVELYN B., 14 Stoneleigh Road, West Newton.
University of Vermont College of Medicine, 1928.

GARDNER, GEORGE E., 107 Cushing Avenue, Belmont.
Harvard Medical School, 1937.

GOEHRING, HARRISON D., 40 White Pine Road, Newton
Upper Falls.
University of Pittsburgh School of Medicine, 1930.

GOLDBERG, JOSEPH, 384 Ferry Street, Malden.
Middlesex University School of Medicine, 1929.

HAUPTMANN, ALFRED, 12 Kilsyth Terrace, Brighton.
University of Heidelberg, 1905.

HAYES, DONALD R., 88 Marianne Road, Waltham.
Harvard Medical School, 1936.

HUEBER, JOHN W., 25 Day Street, West Somerville.
Tufts College Medical School, 1939.

INGELFINGER, FRANZ J., 127 Washington Street, Brighton.
Harvard Medical School, 1936.

IZEN, DAVID S., 223 Main Street, Medford.
Middlesex University School of Medicine, 1930.

KAPLAN, ISADORE, 137 Ferry Street, Everett.
Middlesex University School of Medicine, 1936.

KUBIK, CHARLES S., Lincoln Road, South Lincoln.
Rush Medical College of the University of Chicago,
1914.

LAMPHIER, JAMES A., 53 Eliot Memorial Road, Newton.
Tufts College Medical School, 1935.

LOWELL, FRANCIS C., 86 Irving Street, Cambridge.
Harvard Medical School, 1936.

LOWENTHAL, THERESA U., 45 Englewood Avenue,
Brighton.
University of Berlin, 1925.

MARTIN, DONALD A., Middlesex County Sanatorium,
Waltham.
University of Edinburgh, 1936.

MAUTNER, HANS, 880½ Main Street, Waltham.
University of Vienna, 1909.

MEINHARDT, CHARLES, 271-A Salem Street, Malden.
College of Physicians and Surgeons, Boston, 1935.

MORTARA, FRANCO, 585 Broadway, Somerville.
University of Bologna, 1932.

NAUEN, ALICE, 142 Sutherland Road, Brighton.
University of Hamburg, 1926.

NOTHMANN, MARTIN M., 24 Colborne Road, Brighton.
University of Breslau, 1921.

PINTO, SHERMAN S., 11-A Lakeview, Arlington.
University of Nebraska College of Medicine, 1932.

PIPPITT, RICHARD B., 3 Langdon Square, Cambridge.
Harvard Medical School, 1937.

PUTNAM, MARIAN C., 59 Larchwood Drive, Cambridge.
Johns Hopkins University School of Medicine, 1921.

RICHARDS, HAZEL H., 234 Main Street, Malden.
Massachusetts College of Osteopathy, 1927.
Middlesex University School of Medicine, 1930.

RILEY, JOSEPH G., 465 Lexington Street, Waltham.
Tufts College Medical School, 1939.

RITVO, MEYER, 46 Charles River Road, Watertown.
Middlesex University School of Medicine, 1935.

RUESCH, JURGEN, 13 Shepard Street, Cambridge.
University of Zürich, 1935.

SINGER, KARL, 1133 Commonwealth Avenue, Allston.
University of Vienna, 1927.

THIMANN, JOSEPH, 236 Concord Avenue, Cambridge.
University of Vienna, 1923.

TUOHY, EDWARD L., 17 Longfellow Road, Cambridge.
University of Minnesota Medical School, 1931.

Alexander A. Levi, *Secretary*.

NORFOLK DISTRICT

BAYLES, THEODORE B., 52A Eliot Street, Jamaica Plain.
Harvard Medical School, 1936.

CIVEN, EVA, 1077 Blue Hill Avenue, Dorchester.
Middlesex University School of Medicine, 1925.

FAILLACE, FEDELE M., 44 Penniman Road, Brookline.
University of Rome Faculty of Medicine and Sur-
gery, 1934.

FERGUSON, ALBERT B., 1080 Beacon Street, Brookline.
Cornell University Medical College, 1917.

HERTZ, SAUL, 144 Grove Street, Brookline.
Harvard Medical School, 1929.

HESS, LEO, 83 Thorndike Street, Brookline.
University of Vienna, 1903.

HOFFMANN, RICHARD, 327 St. Paul Street, Brookline.
University of Vienna, 1920.

- JOSSMANN, PAUL B., 47 Mason Terrace, Brookline.
University of Geneva School of Medicine, 1920.
- KARPATI, OSCAR, 1477 Beacon Street, Brookline.
Royal Hungarian Elizabeth University, 1926.
- KURZMANN, RUDOLF, State Prison Colony Hospital,
Norfolk.
University of Vienna, 1921.
- LAWRENCE, KNOWLES B., 87 Perry Street, Brookline.
Yale University School of Medicine, 1934.
- LEPEHNE, GEORG, 590 Washington Street, Brookline.
University of Königsberg, 1910.
- LOWENBERG, BENJAMIN, 517 Washington Street, Dor-
chester.
Des Moines College of Osteopathy, 1930.
University of Lausanne Faculty of Medicine, 1939.
- LOWENTHAL, FREDERICK, 140 Thorndike Street, Brookline.
University of Bonn, 1913.
- LOWIS, SAMUEL, 114 University Road, Brookline.
Harvard Medical School, 1934.
- LINSADA, ALDO A., 30 Gibbs Street, Brookline.
Royal University Medical School, Florence, 1924.
- MCDANIEL, LEWIS T., 2 Autumn Street, Boston (Rox-
bury).
Harvard Medical School, 1936.
- MCDERMOTT, LEO J., 372 Longwood Avenue, Boston
(Roxbury).
Harvard Medical School, 1934.
- McFADDEN, JAMES M., JR., 66 Southbourne Road, Jamaica
Plain.
Indiana University School of Medicine, 1936.
- MEYERS, MARVIN T., 406 Centre Street, Jamaica Plain.
Kansas City University of Physicians and Surgeons,
1931.
- MEZER, JACOB, 16 Angell Street, Dorchester.
Tufts College Medical School, 1936.
- MILLEN, HYMAN, 999 Dorchester Avenue, Dorchester.
Middlesex University School of Medicine, 1929.
- MILONE, ANTONIO P., 4354 Washington Street, Roslindale.
Middlesex University School of Medicine, 1934.
- MULLIN, CHARLES S., JR., Boston State Hospital, Dor-
chester Center.
Tufts College Medical School, 1936.
- POR, FRIEDA, 9 Sewall Avenue, Brookline.
University of Vienna, 1923.
- PRESSER, KARL, 210 Riverway, Boston (Roxbury).
University of Vienna, 1924.
- REINAUER, ANNA J., 64A University Road, Brookline.
Friedrich-Alexanders University, 1931.
- SURY, HOWARD I., 137 Englewood Avenue, Brookline.
Harvard Medical School, 1934.
- VON BRUECKE, DORA, 491 Huntington Avenue, Boston
(Roxbury).
University of Vienna, 1904.
- WHITE, GEORGE, Pondville Hospital, Wrentham.
Tufts College Medical School, 1936.
- WILKINS, ROBERT W., 70 Upland Road, Brookline.
Harvard Medical School, 1933.
- ZAUDY, ELEONORE C., New England Hospital for Women
and Children, Roxbury.
University of Bern, 1935.

Frank S. Cruickshank, *Secretary*.

NORFOLK SOUTH DISTRICT

- BLISS, SHELDON P., 69 Commercial Street, East Braintree.
Tufts College Medical School, 1939.
- BUTLER, HENRY R., 20 Fenno Street, Quincy.
Harvard Medical School, 1926.
- DAVIS, ALBERT, 191 Sea Street, Quincy.
Middlesex University School of Medicine, 1936.
- FRANKMAN, WILLIAM, 736 Hancock Street, Wollaston.
St. Louis College of Physicians and Surgeons, 1921.
- PEARLSTEIN, MAX, 447 Washington Street, Braintree.
Tufts College Medical School, 1929.
- SLOANE, WILLIAM C., 15 South Main Street, Randolph.
Middlesex University School of Medicine, 1934.
- Henry H. A. Blyth, *Secretary*.

PLYMOUTH DISTRICT

- MARK, MARTIN S., 263 West Elm Street, Brockton.
University of Munich, 1922.
- SCHERMAN, RICHARD P., Plymouth County Hospital,
South Hanson.
University of Munich, 1920.
- Ralph C. McLeod, *Secretary*.

SUFFOLK DISTRICT

- ADLER, ALEXANDRA, 466 Commonwealth Avenue, Boston.
University of Vienna, 1926.
- CAREY, EDWARD G., Massachusetts Memorial Hospitals,
Boston.
Tufts College Medical School, 1937.
- COLLINS, ARTHUR W., 226 Bay State Road, Boston.
Tufts College Medical School, 1921.
- CONLIN, JOHN F., John Adams Hospital, Chelsea.
Tufts College Medical School, 1938.
- CORDRAY, DAVID P., 240 Commonwealth Avenue, Boston.
University of Pennsylvania School of Medicine, 1936.
- CORRADO, JOHN C., 104 St. Andrews Road, East Boston.
Middlesex University School of Medicine, 1933.
- DALRYMPLE, LEOLIA A., 245 Commonwealth Avenue,
Boston.
University of Toronto Faculty of Medicine, 1925.
- DIEUAIDE, FRANKS R., 5 Chestnut Street, Boston.
Johns Hopkins University School of Medicine, 1920.
- DINGLE, JOHN H., 818 Harrison Avenue, Boston.
Harvard Medical School, 1939.
- FREUND, ERNST, 1163 Boylston Street, Boston.
University of Prague, 1900.
- GOGLIA, ALFRED A., 62 Bennington Street, East Boston.
College of Physicians and Surgeons, Boston, 1936.
- GOLDSTEIN, KURT, 334 Commonwealth Avenue, Boston.
Medical College of Breslau, 1903.
- MARCUS, PHILIP S., 17 Worcester Square, Boston.
University of Tennessee College of Medicine, 1936.
- MCDONALD, EUGENE J., Boston City Hospital, Boston.
Tufts College Medical School, 1937.
- RHEES, MORGAN J., Massachusetts General Hospital,
Boston.
Harvard Medical School, 1925.
- SEIGAL, HAROLD L., Boston City Hospital, Boston.
Jefferson Medical College of Philadelphia, 1938.

SPIEGEL, ERWIN, 452 Park Drive, Boston.

University of Prague, 1928.

ULFELDER, HOWARD, Massachusetts General Hospital, Boston.

Harvard Medical School, 1936.

VILKER, ARTHUR H., 13 Nahant Avenue, Revere.

Middlesex University School of Medicine, 1930.

WOODS, WILLIAM L., 2 Primus Avenue, Boston.

University of Toronto Faculty of Medicine, 1928.

ZOLLO, FELICE J., 145 Lynnway, Revere.

Middlesex University School of Medicine, 1928.

Milton Henry Clifford, *Secretary*.

WORCESTER DISTRICT

APPLEYARD, ARTHUR E., Broad Street, Barre.

Tufts College Medical School, 1939.

COMPSON, JAMES E., 119 Belmont Street, Worcester.

Harvard Medical School, 1939.

GOLICKMAN, LOUIS, 99 Church Street, Whitinsville.

Middlesex University School of Medicine, 1933.

HAIGHT, MEYER H., Main Street, West Warren.

Middlesex University School of Medicine, 1935.

KRETZMER, EUGENE, 29 Maplewood Road, Worcester.

University of Munich, 1908.

MEANY, JOHN H., Worcester City Hospital, Worcester.

McGill University Faculty of Medicine, 1937.

MORRIS, SOLI, Grafton State Hospital, North Grafton.

New York University College of Medicine, 1937.

PATTON, WILLIAM E., Grafton State Hospital, North Grafton.

Washington University School of Medicine, 1934.

PORAS, HARRY H., 234 Chestnut Street, Clinton.

University of Vienna, 1929.

REEVES, DOROTHY M., 68 Uxbridge Street, Worcester.

University of Michigan Medical School, 1938.

ROTHSCHILD, ALFRED F., 167 Lincoln Street, Worcester.

University of Munich, 1918.

SAVIGNAC, RAYMOND J., 35 Freeland Street, Worcester.

University of Strasbourg, 1934.

SMITH, EUGENE F., 6 Park Terrace, Milford.

Tufts College Medical School, 1935.

SULZBERGER, FRED M., 14 Coolidge Avenue, Southbridge.

University of Munich, 1922.

TELL, ABRAM B., 135 Chandler Street, Worcester.

Kansas City University of Physicians and Surgeons, 1931.

ZARITT, HYMAN I., 17 Main Street, Gilbertville.

Middlesex University School of Medicine, 1935.

George C. Tully, *Secretary*.

WORCESTER NORTH DISTRICT

ARGOFF, JOSEPH, 813 River Street, Fitchburg.

Missouri College of Medicine and Science, 1927.

BURKE, ARTHUR E., Gardner State Hospital, East Gardner.

Tufts College Medical School, 1937.

GROSSMAN, MYER J., 599 Main Street, Athol.

Middlesex University School of Medicine, 1933.

HESS, FRANCIS, 38 Main Street, Gardner.

University of Vienna, 1926.

LEVINGER, MAX D., 440 Main Street, Fitchburg.

University of Munich, 1919.

PARNES, JACOB, 7 Main Street, Leominster.

University of Prague, 1937.

Edward A. Adams, *Secretary*.

DEATHS

GODFREY—THOMAS F. GODFREY, M.D., of Springfield, died April 2. He was in his seventieth year.

Born in Northampton, he attended the University of Vermont and received his degree from the College of Physicians and Surgeons of Baltimore, Maryland, 1898. He was a former member of the Massachusetts Medical Society.

His sister and two brothers survive him.

GREENE—DANIEL C. GREENE, M.D., of Newton, died April 4. He was in his sixty-ninth year.

Born in Kobe, Japan, he attended Harvard University and received his medical degree from the Harvard Medical School in 1899. Dr. Greene had formerly been on the staffs of the Massachusetts General and Children's hospitals and was also on the teaching staff at Harvard Medical School from 1911 to 1930, first as a fellow and then as instructor in laryngology.

Dr. Greene was a fellow of the Massachusetts Medical Society and the American Medical Association, and had memberships in the American Laryngological, Rhinological and Otological Society and the American College of Surgeons.

His widow, two daughters and three sons survive him.

OTT—GEORGE J. OTT, M.D., of Boston, died March 1. He was in his seventy-fourth year.

Born in Bavaria, he lived in Clinton, Massachusetts until his graduation from medical school. He received his degree from the Albany Medical College in 1894, and was a fellow of the Massachusetts Medical Society and the American Medical Association.

WILLIAMS—HUBERT J. WILLIAMS, M.D., of Boston, died March 29. He was in his sixty-second year.

Born in Boston, he received his degree from Tufts College Medical School in 1901. He was a former member of the Massachusetts Medical Society and retired from active practice in 1932 because of ill health.

Two daughters survive him.

NOTICES

MEDICAL AND SURGICAL SUPPLY COMMITTEE

It will help England greatly in the care of victims of bombing raids and help England prepare for the coming invasion, if physicians in this country will give discarded or superfluous surgical instruments or surgical dressings.

Any such material should be sent to the Medical and Surgical Supply Committee, 420 Lexington Avenue, New York City.

WILLIAM HARVEY SOCIETY

The seventh lecture of the present series given under the auspices of the William Harvey Society of the Tufts College Medical School will be held in the auditorium of the Beth Israel Hospital on Friday, April 18, at 8

pri Dr George B Wislocki will speak on 'The Vascular Supply and Topography of the Mammary Pituitary Gland' Dr Benjamin Spector will preside

All interested members of the medical profession are invited to attend

BOSTON DOCTORS SYMPHONY ORCHESTRA



The Boston Doctors' Symphony Orchestra will give its second annual concert on Sunday, May 11, at 8 15 p m in Jordan Hall Alexander Thuede will conduct Dr Werner Mueller will appear as soloist

Proceeds of the concert will be used for the establishment of a fund for a free bed in each of the following hospitals: Beth Israel Hospital, Children's Hospital, Massachusetts Eye and Ear Infirmary and Boston Dispensary. Tickets at \$1.00 may be obtained by applying to Dr Julius Lomax, Pelham Hall Hotel, Brookline (BEA 2430)

NEW ENGLAND PEDIATRIC SOCIETY

A meeting of the New England Pediatric Society will be held on Wednesday, April 30. The clinical presentation will be held at the Children's Hospital, and all the other events at Longwood Towers, Brookline

PROGRAM

- 4 00 Clinical presentation by Dr Kenneth D Blickstein and his associates at the Children's Hospital
- 6 30 Refreshments
- 7 00 Dinner
- 8 00 Some Physiologic Peculiarities of the Premature Infant Dr Samuel Z Levine, professor of pediatrics, Cornell University Medical College New York City

CARNEY HOSPITAL

The monthly clinical meeting and luncheon of the staff of the Carney Hospital will be held in the auditorium of the Carney Hospital on Wednesday, April 16 at 11 30 a m

PROGRAM

- Case Reports
 - Orthopedic Dr A Leo Brett
 - Gynecologic Dr L E Phaneuf
 - Surgical Dr A M Fraser
- Clinicopathological Conference
- Physicians and medical students are invited to attend

ROBERT BRECK BRIGHAM HOSPITAL

Dr Albert B Ferguson will speak on Roentgenographic Features in Rheumatoid Arthritis at the Robert Breck Brigham Hospital on Tuesday, April 15, at 7 45 p m Drs Sidney Morrison and Aubrey O Hampton will lead the discussion

MASSACHUSETTS MEMORIAL HOSPITALS

There will be a staff meeting of the Massachusetts Memorial Hospitals at the Evans Memorial Auditorium on

Friday, April 25, at 8 15 p m Dr Samuel N Vose will be chairman

PROGRAM

- The Surgical Treatment of Deafness Dr Leighton F Johnson Discussion by Dr Philip E Meltzer
- Some Experiences with Ureteroenterostomy (illustrated by motion pictures) Dr George Gilbert Smith

NEW ENGLAND SOCIETY OF PHYSICAL MEDICINE

The New England Society of Physical Medicine will hold its monthly meeting at the Hotel Kenmore, Boston, on Wednesday, April 16, at 8 00 p m. The evening will be devoted to important business of the society. There will be no scientific program.

The council will meet at 6 00 p m, followed by an informal dinner at 6 30 p m

NEW ENGLAND PATHOLOGICAL SOCIETY

There will be a meeting of the New England Pathological Society on Thursday, April 17, at 8 p m at the Peter Bent Brigham Hospital

PROGRAM

- Tumors of the Peripheral Nerves Dr Arthur Purdy Stout, associate professor of surgery, Columbia University College of Physicians and Surgeons, and attending surgical pathologist, Presbyterian Hospital and Sloane Hospital for Women

MASSACHUSETTS SOCIETY FOR RESEARCH IN PSYCHIATRY

The next meeting of the Massachusetts Society for Research in Psychiatry will be held at the Monson State Hospital, Palmer, Massachusetts, on Tuesday, April 15. Luncheon will be served at 1 p m, followed by the program

PROGRAM

- Gingival Changes Produced by Dilantin Sodium Dr Leon J Robinson, Monson State Hospital
- Research in Mental Deficiency with Special Reference to Birth Injury Dr Clemens Benda, Wrentham State School
- Double Symmetrical Porencephalies Dr Paul Yarkovitz, Walter E Ferriell State School, and Dr Richard C Wadsworth, Metropolitan State Hospital

MEDICAL LIBRARY ASSOCIATION

The forty third annual meeting of the Medical Library Association will be held at the University of Michigan Medical School, Ann Arbor, Michigan, on Thursday, Friday and Saturday, May 29, 30 and 31, under the presidency of Col Harold W Jones, of the Army Medical Library, Washington, D C. Hotel headquarters will be at the Michigan Union. The program will include papers on the co-operation of libraries, union catalogues, medical history and industrial medicine

CALIFORNIA STATE PERSONNEL BOARD

The California State Personnel Board has waived the one year California residence requirement for applicants to fill current vacancies on the medical staffs of various

state institutions. All interested in positions as senior interns and student interns, which carry salaries as well as providing maintenance, should apply to Louis J. Kroeger, State Personnel Board, 1025 P Street, Sacramento.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, APRIL 13

MONDAY, APRIL 14

12:15-1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.

*7:30 p.m. Roentgenology of the Bones and Joints. Dr. Albert B. Ferguson. Evans Auditorium, 78 East Concord Street, Boston.

TUESDAY, APRIL 15

*9-10 a.m. Medical Ophthalmology. Dr. S. T. Clarke. Joseph H. Pratt Diagnostic Hospital.

*12 m. The Present-Day Treatment of Prostatism. Dr. Richard Chute. South End Medical Club. Headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston.

12:15-1:15 p.m. Clinicoroentgenologic conference. Peter Bent Brigham Hospital amphitheater.

*12:30 p.m. Medical Council of Boston. Palmer Memorial Hospital, 195 Pilgrim Road, Boston.

7:45 p.m. Roentgenographic Features in Rheumatoid Arthritis. Dr. Albert B. Ferguson. Robert Breck Brigham Hospital.

WEDNESDAY, APRIL 16

*9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

*11:30 a.m. Monthly clinical meeting and luncheon of the staff. Auditorium, Carney Hospital.

*12 m. Clinicopathological conference. Children's Hospital.

8 p.m. New England Society of Physical Medicine. Hotel Kenmore, Boston.

THURSDAY, APRIL 17

*8:30 a.m. Combined clinic of the medical, surgical, orthopedic and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital, at the Peter Bent Brigham Hospital.

*9-10 a.m. Endocrinologic Relation between the Hypophysis and the Eye: Problems and facts. Dr. J. Igersheimer. Joseph H. Pratt Diagnostic Hospital.

8 p.m. Tumors of the Peripheral Nerves. Dr. Arthur Purdy Stout. New England Pathological Society. Peter Bent Brigham Hospital.

*8:15 p.m. Problems in Urinary Lithiasis. Dr. Richard Chute. United States Naval Hospital, Chelsea.

FRIDAY, APRIL 18

*9-10 a.m. What Happens to Alcoholics. Dr. Merrill Moore. Joseph H. Pratt Diagnostic Hospital.

*8 p.m. The Vascular Supply and Topography of the Mammalian Pituitary Gland. Dr. George B. Wislocki. William Harvey Society. Beth Israel Hospital, Boston.

*Open to the medical profession.

APRIL 15 — Massachusetts Society for Research in Psychiatry. Page 671.

APRIL 20 — Free public lecture, Quincy City Hospital. Page 436, issue of March 6.

APRIL 21-25 — American College of Physicians. Page 1065, issue of June 20.

APRIL 25 — Salem Tumor Clinic. Page 579, issue of March 27.

APRIL 25 — Massachusetts Memorial Hospitals. Page 671.

APRIL 28-30 — American Academy of Physical Medicine. Scientific session. Page 579, issue of March 27.

APRIL 30 — Boston Society of Biologists. Page 579, issue of March 27.

APRIL 30 — New England Pediatric Society. Page 671.

MAY 5-9 — American Association of Industrial Physicians and Surgeons and American Industrial Hygiene Association. Page 484, issue of March 13.

MAY 8 — Pentucket Association of Physicians. Page 263, issue of August 15.

MAY 11 — Boston Doctors' Symphony Orchestra. Second annual concert. Page 671.

MAY 13-16 — National Gastroenterological Association. Hotel Commodore, New York City.

MAY 21, 22 — Massachusetts Medical Society, Boston.

MAY 28-JUNE 2 — American Board of Obstetrics and Gynecology. Page 262, issue of February 6.

MAY 29-31 — Medical Library Association. Page 671.

MAY 30, 31 — American Heart Association. Hotel Statler, Cleveland.

MAY 30-JUNE 2 — American College of Chest Physicians. Hotel Statler, Cleveland.

JUNE 2-6 — American Medical Association. Cleveland.

OCTOBER 14-17 — American Public Health Association. Page 573, issue of March 27.

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

MAY 14 — Relation of the Doctor to the Law. Mr. Leland Powers. New Ocean House, Swampscott.

FRANKLIN

MAY 13 — This meeting will be held at 11 a.m. at the Franklin County Hospital, Greenfield.

NORFOLK

MAY 8 — Censors' meeting. Hotel Puritan.

SUFFOLK

APRIL 30 — Page 604, issue of October 10.

MAY 1 — Censors' meeting. Page 261, issue of February 6.

BOOK REVIEWS

The Abnormal in Obstetrics. By Sir Comyns Berkeley, M.A., M.C., M.D. (Cantab.), F.R.C.P. (Lond.), F.R.C.S. (Eng.), M.M.S.A. (Hon.), F.C.O.G.; Victor Bonney, M.S., M.D., B.Sc. (Lond.), F.R.C.S. (Eng.), F.R.A.C.S. (Hon.), M.R.C.P. (Lond.); and Douglas MacLeod, M.S., M.B. (Lond.), F.R.C.S. (Eng.), F.R.C.P. (Lond.), M.C.O.G. 8°, cloth, 525 pp., with 6 illustrations. Baltimore: William Wood and Company, 1938. \$6.00.

This is a miniature encyclopedia of deviations from the normal in female reproduction. Although it is not a textbook, it may offer suggestions for explorations into the literature to one concerned with a specific abnormality or some effective factor in an obstetric or gynecologic condition.

Unlike most foreign textbooks, this one shows a fair knowledge of American concepts and practices. It manifests acquaintance with conditions affecting pregnancy in cultures and climes far removed from the teaching clinics of the British Isles. There is no provincialism, and many rare and astonishing cases are mentioned. Diagnostic details and therapeutics, however, as expressed in any of several domestic textbooks are far better for the purposes of American clinicians. This volume is not intended as a vade mecum, but rather as a survey and short discussion of all conditions subject to the twin specialty. This avowed purpose, perhaps, excuses it from the fuller annotations and references, which would authenticate or at least denote the sources of most of the statements made. This lack of substantiation gives the text an air of informality pleasant for browsing but inadequate for learning. There is a bibliography for each chapter, ranging from one item for miscarriage to fifty-four for tumors of the uterus and ovary.

There are a few line drawings in the chapter on transfusion and clyses. One shows the cistern and conductor for a Murphy drip. Another illustrates a table set up for collecting blood for a citrate transfusion, with a foot pump to suck air out of the receiving bottles and a donor with a cuff on his upper arm. The book is well bound and well printed.

La créatine: étude physico-chimique. By Jean Vague and Jean Duncan. 8°, paper, 256 pp. Paris: Masson et Cie, 1939. \$1.40.

This book seems a reasonably adequate review of the work on creatine and muscle metabolism, and the bibliography appears to be unusually complete.

The New England Journal of Medicine

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VOLUME 224

APRIL 17, 1941

NUMBER 16

MYCOTIC INFECTIONS OF THE SKIN*

OLIVER S. ORMSBY, M.D.

CHICAGO

THE cutaneous infections discussed in this paper include ringworm of the hands and feet, and several cutaneous conditions formerly classed as separate entities but now known to be due to yeasts or yeastlike micro-organisms.

RINGWORM INFECTIONS

Ringworm of the hands and feet was practically unknown in the United States until 1916, when Ormsby and Mitchell¹ reported a group of 65 patients, in all of whom fungi were demonstrated microscopically. This study included patients suffering with dyshidrosis and intertriginous eczema. Reports of cases had been made previously by Montgomery and Culver² (1914), by Hartzell³ (1915) and by Lane⁴ (1916). Some years later, intensive investigative work was instituted; it has been carried on throughout this country until the affection is now accorded a prominent place in the minds of both physicians and the laity. Its importance is undoubtedly exaggerated in the popular mind. The chief criticism at present from the dermatologist's standpoint is that the layman considers practically every cutaneous affection occurring on the feet and hands to be ringworm and treats it accordingly. Unfortunately, numerous physicians fall into the same error, but to a lesser degree. On account of the popular demand for self treatment, numerous proprietary articles are advertised and extensively sold, some of which inflict much damage. I believe that it is essential that the diagnosis of ringworm be confirmed microscopically in every case before treatment is instituted, and I have done this since the beginning. Unfortunately, many practitioners rely solely on the clinical symptoms for a diagnosis.

Clinical Description

The affection was early described by Whitfield and Kaufmann-Wolf. Each described three clinical

types: the acute vesiculobullous, the chronic intertriginous, secondary to the first type, and the chronic hyperkeratotic. In our original investigation we were able to confirm these findings. The initial lesions are vesicles and may be single, multiple, grouped or widely distributed. The vesicles are deep seated, slightly elevated or level with the surface and resemble boiled sago grains imbedded in the epidermis—this comparison is always made in so called "dyshidrosis." The content of the vesicle is serous unless contaminated by secondary infection. As a rule the early vesicles are not surrounded by redness. After several days to a week, the fluid is absorbed, and a brown macule remains. After desiccation, the roof of the vesicle becomes torn, exposing a red, smooth, shining surface surrounded by a collaret of scales. Sometimes the roof of the vesicle, instead of scaling, develops into a brown keratotic button 1 to 2 mm. thick. Beneath these keratotic lesions the usual red, shining surface is not found. It is through the multiplication of this type of lesion that the hyperkeratotic variety of the disease is produced. In acute cases the vesicles may be grouped, may become confluent and may form bullae. In extensive bullous cases the patients may be incapacitated for weeks. At times well defined, shiny red, circular areas, denuded of the corneal layer through desiccation and desquamation of groups of vesicles, develop in dry areas, such as in the center of the palm or on the sole or the arch of the foot. These patches may heal spontaneously, or new vesicles may continue to form around the periphery, with extension in one or several directions. The grouped vesicles may develop into a dry or moist, well-defined, eczematous area. In order of frequency of occurrence, the affected areas are the fourth interspace of the foot, the plantar surface of the arch and the tuberosity of the fifth metatarsus. At the base of the fifth toe, a fissure occupying both the interdigital and plantar areas is commonly present. Occasionally, similar fissures occur in the flexor folds of all the toes. In the fourth interspace, a white,

*Presented at the New England Postgraduate Assembly, Cambridge, Massachusetts, November 13, 1940.

Portions of this paper have been published in the following journals: *Medical Record and Annals* (29:59-64, 1935); *Pennsylvania Medical News* (6:3, 1935); *Journal of the American Medical Association* (55:295-301, 1935); and *Journal of the Michigan State Medical Society* (37:135-140, 1938).

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sodden, thickened, adherent mass of epidermis is of common occurrence and is produced through maceration of the exfoliated epidermis. This condition occasionally extends to other interspaces. In the keratotic variety, areas of keratoderma are formed, usually symmetrically and oftener on the soles. Occasionally, a diffuse palmar and plantar keratoderma develops. One of the cases studied in our original investigation had had symmetrical palmar and plantar keratoderma for thirty-two years. When the disease is complicated by secondary infection, there is often much swelling and edema of the undersurface of the toes, the contiguous portion of the soles and the intertriginous surface of the toes. Under these circumstances much tenderness and pain is experienced.

Ordinarily the chief subjective symptom is itching, which may be moderate to severe but is practically always present. In the widespread acute bullous cases, as well as those complicated with secondary infection, sensitiveness and pain are characteristic. Although in most cases the eruptive manifestations are limited to the feet and hands, occasionally well-defined, scaling patches of dermatitis may occur over the trunk and limbs, and in these the causative fungus can be found.

Diagnosis

The major portion of cases of dyshidrosis are examples of ringworm, like a great many cases formerly classed as intertriginous eczema, together with a certain percentage of cases of localized keratoderma of the hands and feet. An immediate diagnosis can nearly always be made by a microscopic examination of the roof of a sago-grain vesicle or of scales taken from the interdigital spaces, as well as from other scaling areas on the foot. The material to be examined is placed on a slide in a drop of a 10 to 20 per cent solution of sodium hydroxide. If the roof of the vesicle is used, it is placed with its undersurface up, the cover slip is placed over the preparation and the slide is gently heated until the preparation boils. Examination with a medium-powered lens reveals the fungus, which is seen as jointed mycelial filaments.

Disorders from which ringworm is to be distinguished are dyshidrosis, eczema, a resistant vesicular dermatitis of the palms and soles, a superficial vesicular eruption probably of infectious origin, an external irritant dermatitis and a pustular eruption of the palms and soles described below. Although the major portion of cases of what were formerly considered dyshidrosis are examples of ringworm, there still remain a number that can be regarded as dyshidrosis; these patients usually present a constitutional background, indicated

by circulatory changes, excessive sweating and so forth. In the resistant vesicular dermatitis, which is probably of toxic origin, the vesicles are usually deep seated, limited to the palms and soles, and do not involve the intertriginous areas. In practically all the cases that I have seen, the affection has been considered ringworm and treated as such without beneficial results. In the superficial vesicular type of infectious origin, similar areas of dermatitis may be observed on the glabrous skin; this finding is of diagnostic importance. In the external irritant type, the lesions are apt to be between the fingers and on the dorsum rather than on the palmar surface. In none of these is the ringworm fungus found microscopically.

Ringworm is readily distinguished from a pustular infection occurring on the palms and soles that has been described by Barber⁵ as pustular psoriasis, by Audry⁶ as an abortive form of *acrodermatitis continua*, and by Andrews, Birkman and Kelly⁷ as a recalcitrant pustular eruption of the palms and soles. This lesion is characterized by an exfoliative type of dermatitis beginning in the center of the palms, extending over the thenar and hypothenar eminences and at times covering the entire palm and palmar surface of the fingers. On the feet it occurs characteristically on the insteps, from which it may spread over the entire plantar surface. The interdigital areas, usually invaded by ringworm, are free. The early lesion is a small flat discrete pustule. Throughout the patch there are scattered pustules and crusts. These are more abundant at the margins. The course of the affection is characterized by periods of activity and partial quiescence. During the former, severe burning sensations occur. The lesions are resistant to treatment, and microscopic examination reveals no fungi.

Absence of fungi in the vesicles or scales taken from the feet is important from a diagnostic standpoint. It is much less significant in similar lesions taken from the palms. This is explained, as noted elsewhere, on the ground that in numerous cases of ringworm infection the palmar lesions are so-called "ide" eruptions, in which micro-organisms are rarely found.

Etiology

Men are affected oftener than women, and the cases have usually been diagnosed as dyshidrosis or eczema. The feet are affected much more frequently than the hands. Eczema marginatum not infrequently precedes the infection. Familial transmission occurs. Infection is more prevalent in warm weather, exacerbations occurring in the spring and autumn, but sporadic cases do occur during the winter months.

Various members of the genera, *Epidermophyton* and *Trichophyton*, are responsible for the affection. These organisms may lie dormant for long periods in calluses, under or about the nail or even in the superficial layers of epidermis between the toes. From these points reinfection occurs when heat and moisture develop in the warm season. Common sources of infection are dressing rooms, runways and shower baths in the athletic departments of schools and universities and in athletic and country clubs. The prevalence of mycotic infection of the feet and its increase in the gymnasiums of universities are well shown by a report by Legge, Bonar and Templeton⁸ from the University of California. At the beginning of the fall gymnasium work, 3105 freshman matriculants were examined; 51.5 per cent of the men showed clinical evidence of ringworm of the feet. At the end of the semester the same medical examiners found the proportion of involvement to be 78.6 per cent, an increase of 27 per cent. The infection was present in 15 per cent of woman matriculants at the beginning of the semester, and this had increased only 2 per cent at the end of that semester.

Treatment

The method of treatment depends on the type of eruption. When the eruption on the feet is acute, accompanied by vesicles and bullae together with secondary infection, hot soaks with a 1:2000 solution of potassium permanganate used two or three times daily are efficacious. In the interim between soaks, soothing ointments containing naphthalan or ichthylol or both may be employed. The following formula is useful:

Naftalan	10
Powdered starch	25
Zinc oxide	25
Petrolatum	<i>q. s. ad</i> 100

Ichthylol (2 per cent) may be substituted for naphthalan. When the acute stages have subsided, an ointment containing salicylic acid and benzoic acid, originally recommended by Whitfield, is efficient:

Salicylic acid	2
Benzoic acid	4
Petrolatum	<i>q. s. ad</i> 30

In our early work we used this or a 10 per cent chrysarobin ointment or suspension.

These preparations cause exfoliation. When this is complete, Hebra's unguentum diachylon alba may be employed at night, with a drying dusting powder containing magnesium carbonate in the morning. The formula for the latter is as follows:

Magnesium carbonate	4
Boric acid	4
Powdered talc	<i>q. s. ad</i> 30

This should be continued for several weeks, during which the salicylic acid and benzoic acid ointment mentioned above should be continuously employed as a prophylactic measure around and beneath the nails, and on calluses, if present. In the subacute and keratotic cases, the keratolytic ointment is advisable from the beginning. In the chronic intertriginous type, curettage, employed when the leathery whitened mass has been softened, hastens recovery. On the hands a zinc oxide and lime water lotion is advisable in the vesicular cases, together with the keratolytic ointment suggested for the feet, but reduced 50 per cent in strength. The formula for the lotion is as follows:

Sodium bichlorate	10
Zinc oxide	15
Powdered starch	15
Lime water	120
Rose water	<i>q. s. ad</i> 240

If the lesions are merely dry and scaling, the ointment will be sufficient.

In certain cases injections of trichophytin may be required. These should be used with caution, the initial doses should be small, and perhaps this method should be reserved for resistant and intractable cases.

Prophylaxis

Prevention on a large scale was practiced by Osborne and Hitchcock⁹ in the high schools of Buffalo. Through experimental work they demonstrated the efficiency of sodium hypochlorite as a preventive measure. They recommend the employment of rubber pans approximately two feet square containing a 1 per cent solution of sodium hypochlorite. These pans are placed in the shower rooms, and the students immerse the feet in one as they go into the bath and into another as they come out. In new athletic departments, wells are built in the floor of the corridor through which the students pass from the dressing room to the shower baths. The disease in the high schools in Buffalo was reduced to a minimum through these measures.

Sterilization of the shoes, socks and other articles of clothing, together with rugs and carpets that have been in contact with the feet of an infected patient, may be accomplished by formaldehyde fumigation. Ayres, Anderson and Youngblood¹⁰ recommend that this method be employed in the bedroom and bathroom of the affected patient. By the use of fumigation with a formaldehyde candle they demonstrated the effectiveness of

this procedure. Individual prophylaxis in country clubs is promoted by the use of wooden-soled sandals between the locker room and shower.

EPIDERMOPHYTIDS

These are eruptions produced by the local action of fungi brought to the skin by way of the blood stream from existing foci. The fungi are immediately destroyed on account of the existing allergy. They may also be secondary to infection of the hands and in the crotch. The ringworm micro-organisms are rarely present.

Ordinarily, the eruptions occur in association with acute and severe attacks of ringworm of the feet. Under these circumstances, the secondary eruption has acute manifestations and runs its course in a short time. In other cases, when the primary focus presents practically no recognizable symptoms, the secondary eruption may be of longer duration. The hands are the commonest site of this eruption, and the lesions may be vesicular or squamous. The vesicles may be superficial or deep, and the degree of the accompanying inflammatory reaction may vary. Occasionally, a more widespread eruption, occurring over the forearms, legs and elsewhere, may resemble pityriasis rosea or multiform erythema. Patches of dermatitis resembling eczema occasionally occur, and in rare cases the eruption may resemble a generalized exfoliative dermatitis.

Microscopic examination of the secondary lesion reveals no micro-organisms, whereas they may be demonstrated abundantly in the primary infection on the feet. An excellent experimental confirmation of these lesions was made by Peck,¹¹ who produced a ringworm infection of the feet in a human subject by inoculation with *Trichophyton gypsum*, which was followed after twenty-four days by a vesicular dyshidrotic type of eruption on the hands. The fungi were readily demonstrable in the primary infection on the feet, but the secondary eruption on the hands was free from organisms and was considered to be an epidermophytid.

Epidermophytids may be distinguished from the eruptions that they resemble by the location of the lesions and the accompanying ringworm infection present on the feet. The trichophytin reaction is positive and is a confirmatory finding. When the secondary eruption is eczematous, the trichophytin test is made by the patch method.

YEAST DERMATOSES (MONILIASIS)

Clinical Description

A number of cutaneous and mucous-membrane infections formerly described as entities have been

found to be due to yeast or yeastlike micro-organisms.¹² Two or more or all these eruptions may coexist in a given patient. Through experimental work all have been produced by inoculation of cultures taken from patients exhibiting the various types of dermatitis.

Paronychia. Mycotic paronychia presents a characteristic picture and has two forms, acute and chronic. The acute form occurs frequently in workers in fruit canneries and in other industrial laborers. The chronic form presents a typical appearance, described by MacLeod¹³ as a "pad or bolster-like swelling of the nail wall, which on being squeezed emits a bead of pus on the nail plate." This enlargement is most marked at the base of the nail and gradually tapers down on the sides toward the distal end of the nail plate. The degree of inflammation varies in different cases, and there is usually an associated dystrophy of the nail plate, owing to interference with the formation of the nail at the lunula. In acute cases, such as those described by Kingery and Thienes,¹⁴ seen in workers in fruit canneries, there is much swelling and pain, and often shedding of the nail.

Onychia. This monilial infection resembles the ringworm type. In the chronic form transverse ridges occur in the nail plate, which becomes opaque, thickened, discolored and brittle. Subungual keratoses are present beneath the lateral and distal portions of the plate, causing it to be raised from the bed.

Perlèche. In this condition, an inflammatory reaction occurs at the angles of the mouth, usually in children.¹⁵ It is characterized by a thickening and whitening of the epithelium, together with fissures. The infection sometimes spreads toward the center of the lip and over the glabrous skin in the immediate vicinity. The thickened epithelium, often likened to mother of pearl, is sometimes easily detached. Occasionally, a moderate degree of crusting occurs. The fissures are superficial and rarely bleed, and ulceration does not occur. A scaling dermatitis of seborrheic type sometimes occurs in the immediate vicinity.

Erosio-interdigitalis. This lesion occurs on the web of the fingers, usually in the third and fourth interspace.¹⁶ It may occupy all the interspaces, and it sometimes occurs between the toes. It is characterized by a shiny red area, surrounded by a collaret of scales; it may also be represented by an accumulated mass of sodden, moist, whitened epidermis. Vesicles are usually absent, although points on the reddened area may indicate former vesiculation. This form of moniliasis is exceedingly difficult to eradicate. In addition to the erosio type of lesion, a vesicular and papulo-

vesicular eruption occurs in the interdigital surfaces, with occasional maceration and fissuring.

Water-bed mycosis. This infection is characterized by the presence of herpetic-appearing vesicles with red areolas, together with pustules.¹⁷ These develop in a continuous water bath or on areas of the skin where moist dressings are applied for a long time. A frequent site is the abdomen, following laparotomy, when moist hot dressings have been employed. At times, when the inflammatory reaction becomes marked, redness, edema, weeping and crusting occur.

Glabrous-skin infections. On the glabrous skin a mycotic dermatitis is characterized by variously sized, well-defined, circular, red, scaling patches. By fusion, gyrate configurations are produced. Moist crusting patches, suggesting eczema, occasionally develop, and in widespread cases there occurs simply a dry dull-red scaling dermatitis. Patches begin with vesicles or vesicopustules, which rupture, leaving denuded red areas surrounded by rings of detached epidermis. These spread peripherally and by coalescence with others form the patches. New vesicles in the vicinity, which develop and undergo the above evolution, result in the invasion of large areas. In the crotch and beneath the breasts and in other intertriginous regions, the bottom of the cleft is usually fissured, and the skin in the involved area is shiny, light to dark red, presents some moisture and has scale-covered margins that are polycyclic in outline. When the anogenital region is involved, varying degrees of itching occur, for the relief of which scratching is practiced; this results in thickening, excoriations and fissuring of the skin. In the anal region the erosio type seen between the fingers is sometimes present.

Patches of dermatitis characterized by redness and vesiculation, scaling and crusting may also be found on the dorsum of the hands and on the forearms. Involvement of these areas frequently occurs in association with the paronychia seen in workers in fruit canneries.

Dermatitis seborrhoeica. The clinical description of this form of dermatitis will not be outlined, since it is familiar to all. The point of interest in this connection is the fact that a yeastlike organism—the pityrosporon of Malassez—was cultivated by MacLeod and Dowling¹⁸ from all types of this affection, and the disorder was reproduced by experimental inoculation. In their work they found it necessary to inject the cultures intradermally, or to rub them into lightly scarified areas, to reproduce the lesions.

Mucous-membrane infections. In addition to

thrush, which has long been known to be of mycotic origin, other forms of stomatitis and glossitis occur. Since there is no symptom complex characteristic of monilial infection, and since these organisms are sometimes found as saprophytes in such diseases as syphilis, some difficulty is encountered in recognizing the infections.

On the lip and buccal mucosa and on the mucous membrane of the pharynx and larynx, grayish-white membranous pellicles of varying dimensions are seen. These pellicles are translucent and usually easily detachable. They also occur on the tongue and gums. When the pellicles become more adherent, there is apparently more thickening, and when detached there are superficial erosions, presenting a clinical picture of leukoplakia.

On the buccal mucosa Engman and Weiss¹⁹ early described a lesion that occurred as a glistening white mat of filiform projections situated on a white macerated base.

On the tongue, Zeisler²⁰ described scroll-like patterns resembling geographic tongue. Robinson and Moss²¹ observed an acute form in which the anterior surface of the tongue was red and the papillae were edematous and eroded; they also noted a chronic form in which the papillae were absent and the surface of the tongue presented a smooth or slippery appearance like wet, red rubber. Miller and Morrow²² described a deep form in which a gummalike lesion developed in the soft palate in the tonsillar region. This lesion developed acutely and caused perforation of the soft palate.

Etiology

Cutaneous and mucous-membrane mycotic infections may occur at any age and in both sexes. Paronychia is at times an occupational disease induced in cases described by Kingery and Thienes¹⁴ by contact with fruit juices in cannery workers, and in the cases described by Sutherland-Campbell²³ by contact with orange juice. It frequently occurs in women who handle sugar, such as those employed in confectionery factories, and in pastry cooks. Diabetes is occasionally a predisposing factor. In the erosio type, constant immersion of the hands in water, a condition imposed in washerwomen, is effective, and constant wet dressings constitute the predisposing factor in the waterbed type. Infection of the skin in infants frequently comes from oral and intestinal thrush, and in adults not infrequently from the stools. The organism most frequently found is *Monilia albicans* (*Oidium albicans*). Cryptococci, the pityrosporon of Malassez and other yeastlike organisms are also concerned in the production of these mycoses.

Diagnosis

The major portion of cases of mycotic infection of the skin due to monilia and related organisms present sufficiently characteristic symptoms to be recognized. A microscopic examination in all cases is essential. Scrapings from the lesions are mounted on a slide in a 10 to 25 per cent solution of sodium hydroxide, over which a cover slip is applied, and the preparation is gently heated. The organism shows plainly and presents the following characteristics with a medium high-power objective: mycelium and sporelike bodies are seen; the myceliums are more delicate and less refractile than those of the ringworm fungi, and septums are rarely demonstrable; oval sporelike bodies, with buds attached to the ends, are also present. In young cultures the organism appears chiefly as round or oval cells, which multiply by budding; in old cultures hyphae develop.

Treatment

Oral thrush in infants responds well to swabbing with a 1 per cent solution of gentian violet, together with mild alkaline mouth washes. For superficial lesions of the mucous membranes of the mouth and vagina, a 3 per cent solution of gentian violet used on a swab twice daily, is efficient. Alkaline mouth washes for the oral cavity and a douche containing a 1:2000 solution of potassium permanganate for the vagina facilitate recovery. For the deeper lesions on the oral mucosa surgical excision, roentgen rays and potassium iodide internally may be necessary.

Paronychia responds quickly to local applications of a 5 per cent suspension of chrysarobin in chloroform. This was originally recommended by Morrow and Lee²⁴ for the treatment of chronic paronychia, before moniliasis had been recognized. In the erosio type, which is resistant, the parts should be kept dry. The local application of a 5 to 10 per cent solution of chrysarobin or tincture of iodine is valuable. In the water-bed type, the suspension of wet dressings, together with the application of zinc oxide and lime water lotion, and the 10 per cent naftalan or 2 per cent ichthyol ointment previously described, soon relieves the condition.

In the intertriginous type, occurring especially beneath the breasts and in the crotch, painting with

a 3 per cent solution of gentian violet is very efficacious. When much inflammatory reaction is present, a preliminary treatment for several days may consist in soaking the parts twice daily with a hot 1:2000 solution of potassium permanganate, dressing the parts in the interim with the naftalan ointment previously mentioned.

In perlèche, Finnerud¹⁵ found the local application of an 8 per cent solution of silver nitrate to be effective. This application may be repeated at intervals of three or four days. Prophylaxis, necessary when this condition occurs in epidemics, consists in the use of individual drinking cups and towels, careful sterilization of the utensils used by the patients, and the avoiding of direct contact.

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REFERENCES

- Ormsby, O. S. and Mitchell, J. H. Ringworm of hands and feet. *J. A. M. A.* 67:711-717, 1916.
- Montgomery, D. W. and Culver, G. D. Eczema marginatum of the toes. *J. A. M. A.* 62:1076-1078, 1914.
- Hartzell, M. B. Eczematoid ringworm, particularly of the hands and feet. *Am. J. M. Sc.* 149:96-101, 1915.
- Lane, J. E. Ringworm of the hands and feet. *Boston M. & S. J.* 174:271-273, 1916.
- Barber, H. W. Acrodermatitis continua vel perstans (dermatitis reptans) and psoriasis pustulosa. *Brit. J. Dermat.* 42:500-518, 1930.
- Audry: cited by Dore, S. E. Note on cases of a chronic mild localized type of acrodermatitis perstans. *Brit. J. Dermat.* 40:12-18, 1928.
- Andrews, G. C., Birkman, F. W. and Kelly, R. J. Recalcitrant pustular eruptions of the palms and soles. *Arch. Dermat. & Syph.* 29:548-553, 1934.
- Legge, R. T., Bonar, L. and Templeton, H. J. Epidermomycosis at the University of California. *Arch. Dermat. & Syph.* 27:12-24, 1933.
- Osborne, E. D. and Hitchcock, B. S. The prophylaxis of ringworm of the feet. *J. A. M. A.* 97:453-455, 1931.
- Ayres, S. Jr., Anderson, N. P. and Youngblood, E. M. Fumigation as an aid in the control of superficial fungus infections. *Arch. Dermat. & Syph.* 24:283-287, 1931.
- Peck, S. M. Epidermophytosis of the feet and epidermophytids of the hands. *Arch. Dermat. & Syph.* 22:40-76, 1930.
- Kumer, L. Die Soormykose der Haut. *Arch. f. Dermat. u. Syph.* 140:105-137, 1922.
- MacLeod, J. M. H. Skin-diseases due to monilia and other yeast-like fungi. *Brit. J. Dermat.* 42:549-561, 1930.
- Kingery, L. B. and Thiénes, C. H. Mycotic paronychia and dermatitis: a hitherto undescribed condition apparently peculiar to fruit canners. *Arch. Dermat. & Syph.* 11:186-202, 1925.
- Finnerud, C. W. Perlèche: a clinical and etiological study in one hundred cases. *Arch. Dermat. & Syph.* 20:454-488, 1929.
- Fabry, J. Ueber Erosio interdigitalis blastomycetica seu saccharomycetica. *München. med. Wchnschr.* 64:1557, 1917.
- Mitchell, J. H. Erosio-interdigitalis blastomycetica. *Arch. Dermat. & Syph.* 5:788-790, 1922. *Ibid.* 6:675-679, 1922.
- Jacobi, E. Eine besondere Form der Trickophytie als Folgeerscheinung der permanenten Bades. *Arch. f. Dermat. u. Syph.* 84:289-300, 1907.
- MacLeod, J. M. H. and Dowling, G. B. An experimental study of the pityrosporon of Malassez: its morphology, cultivation and pathogenicity. *Brit. J. Dermat.* 40:139-148, 1928.
- Engman, M. F. and Weiss, R. S. V. Monilia candida infection of the mouth: Moeller's disease, pneumococcus infection of the tongue, etc. *Arch. Dermat. & Syph.* 1:119-136, 1920.
- Zeisler, E. P. Monilia infection of the tongue. *Arch. Dermat. & Syph.* 15:171-185, 1927.
- Robinson, L. B. and Moss, M. C. Superficial glossitis and perlèche due to monilia albicans: their association with other forms of moniliasis. *Arch. Dermat. & Syph.* 25:644-654, 1932.
- Miller, H. E. and Morrow, H. Cephalosporiosis: an unusual mycotic infection. *Arch. Dermat. & Syph.* 25:294-303, 1932.
- Sutherland-Campbell, H. Paronychia: an attempt to prove the etiologic factor in an epidemic among orange workers. *Arch. Dermat. & Syph.* 19:233-254, 1929.
- Morrow, H. and Lee, A. W. Paronychia. *J. Cutan. Dis.* 33:278-280, 1915.

THE DEVELOPMENT OF THE CONCEPT OF HYPERTENSIVE HEART DISEASE

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GENERAL recognition of the importance of hypertensive heart disease is comparatively recent. Yet more than a century ago physicians were familiar with cardiac hypertrophy unassociated with valvulitis or heart failure, and they devoted considerable discussion to its clinical and post mortem features. In 1930, Weiss¹ traced the historical development of the concept of essential hypertension, but since his study did not deal primarily with the hypertensive heart, a review of this aspect of the problem is of interest.

Corvisart² in 1812 presented a list of factors of possible significance in the production of cardiac hypertrophy not due to valvular disease, but it remained for Bertin,³ about twenty years later, to investigate their relative importance. Bertin appreciated the importance of mechanical obstruction as a cause of hypertrophy, but was unable to explain all forms of cardiac enlargement on this basis. Consequently he proposed the theory that cardiac hypertrophy was due to the "irritating" stimulus of an increased quantity of arterial blood in the chambers of the heart.

Hope,⁴ his English contemporary, however, maintained that cardiac hypertrophy could be explained on the basis of mechanical obstruction alone. In his textbook, published in 1832, he speaks of the effects of a "perinatural" pressure of blood on the heart.

According to the foregoing opinions on the mode of formation of hypertrophy, it will be apparent that every circumstance capable of increasing the action of the heart for a sufficient length of time may be a cause of hypertrophy. These circumstances may be either, first, of a nervous or, second, of a mechanical nature.

The latter class embraces all physical causes which can either accelerate or obstruct the circulation, and thus occasion a perinatural pressure of blood upon the heart.

The physical causes which obstruct the circulation are very numerous. They comprise smallness of the aorta, whether congenital or acquired, dilatation of the aorta, inequalities of its internal surface, all diseases of the valves of the heart which either contract their apertures or impede their movement, adhesion of the pericardium, all affections of the chest that obstruct the circulation through the lungs, as peripneumony, acute, or chronic, empyema, hydrothorax, chronic ca-

tarrh, emphysema. As an obstacle of the circulation operates on the heart in a retrograde direction, the cavity situated immediately behind it is the first to suffer from its influence. Accordingly all the impediments seated in the aorta, its mouth or the arterial system, act primarily on the left ventricle, which, being likewise exposed to the heaviest burden when the circulation is accelerated, has to conflict against a greater variety of exciting causes of hypertrophy, than any other cavity of the heart.

Other writings of this period also give the impression that the existence of an extracardiac factor in the causation of hypertrophy was suspected, the two observations that did most to nurture this suspicion were the frequent association of apoplexy and enlargement of the left ventricle, and Bright's discovery of the association of kidney disease and cardiac hypertrophy. The following statements by Bertin³ and by Hope⁴ indicate how well the first observation was appreciated.

Nothing is better demonstrated in physiology, in the present day, than the influence of the left heart on the circulation of the encephalon, we might, consequently, advance *a priori* that one of the immediate consequences of hypertrophy of the left ventricle would be a predisposition to apoplexy, to encephalitis, and, in fact, to all the cerebral irritations.

Since the researches of the present day have demonstrated that even a slight thickening of the walls of the heart constitutes a morbid state, and have unfolded to view the connection subsisting between that state and a train of symptoms formerly either wholly overlooked or attributed to other causes, instances of apoplexy supervening upon hypertrophy have been so frequently noticed, that the relation of the two as cause and effect is one of the best established doctrines of modern pathology.

Perhaps more important was the observation by Bright⁵ in 1836 that cardiac hypertrophy was frequently associated with contracted kidneys. In his paper, entitled "The Tabular View of the Morbid Appearance in 100 Cases Connected with Albuminous Urine," he established conclusively that there is a relation between kidney disease and cardiac hypertrophy.

The first circumstance which strikes the mind, is the extent and frequency to which the derangement of one organ is connected with the derangement of several others, yet we are not at liberty to assume that the disease of the kidney has been the primary cause on which the depression of the rest depended. It may be that some other organ has first suffered, and that the

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kidneys, together with the rest, have become involved. . . . I am inclined to believe that the kidney is the chief promoter of the other derangements. . . . The obvious structural changes in the heart have consisted chiefly of hypertrophy with or without valvular disease; and what is most striking, out of fifty-two cases of hypertrophy, no valvular disease whatsoever could be detected in thirty-four; but in eleven of these thirty-four, more or less disease existed in the coats of the aorta; still, however, leaving twenty-two without any probable organic cause for the marked hypertrophy generally affecting the left ventricle. This naturally leads us to look for some less local cause, for the unusual efforts to which the heart has been impelled, and the two most ready solutions appear to be, either that the altered quality of the blood affords irregular and unwonted stimulus to the organ immediately; or, that it so affects the minute and capillary circulation, as to render greater action necessary to force the blood through the distant sub-divisions of the vascular system.

Although the clinicians of this period were familiar with nonvalvular hypertrophy as a clinical and pathological entity, they did not clearly understand its relation to cardiac failure. Bertin, for example, contended that it had nothing to do with the signs and symptoms of heart failure, that these were due to other cardiac changes such as valvular lesions, and that uncomplicated cardiac hypertrophy was characterized by evidence of increased cardiac activity and energy of the circulation rather than by signs of failure. To this, Hope also took exception. He agreed that it might be true of the pure uncomplicated form of cardiac hypertrophy, before embarrassment of the circulation had occurred, but not later:

. . . the truth I believe to be, that the very same energy of the circulation which gives rise to active hemorrhage, apoplexy, etc., causes, as its next effect, engorgement of the arterial capillary system; the necessary consequence of which is serous infiltration and more or less of all the other symptoms indicative of retardation of the circulation.

Thus Hope pointed out a connection between nonvalvular cardiac hypertrophy and heart failure, but he had little understanding of the nature of heart failure, believing as he did that it was a consequence of the effects of hypertrophy on the peripheral capillary system. A clear description of the nature of heart failure did not appear until the writings of Bamberger⁶ in 1857.

Bright's conception of renal disease as the primary focus of a general disturbance stimulated further observation that finally led to the recognition of the following separate clinical entities: essential hypertension, diffuse atherosclerosis and primary renal disease with hypertension. Wilks,⁷ in 1852, called attention to the occurrence of thickened and tortuous arteries in Bright's disease, and also pointed out that albuminuria was not invari-

ably present. He thus raised the possibility that other conditions might precede the loss of kidney function. At this time Johnson⁸ held that it was the small vessels of the body, including even those of the skin, that were contracted and thickened in nephritis. He proposed the thesis that the toxic blood was unable to nourish the tissues; that the minute arteries resisted the passage of this toxic blood and that, as a result of this resistance, both cardiac and arterial muscle tissue became hypertrophied. Traube⁹ also maintained that in renal disease an increased resistance to renal blood flow resulted in an abnormal tension in the aortic system and hypertrophy of the left ventricle. In his discussion of kidney disease, Traube states:

I believe that the cause for the increase in aortic tension is the abnormal resistance which results from the inflammation of the kidneys and which obstructs the outflow of blood from the aorta through the vessels of the kidney. . . . This increase in tension in the aortic system caused by the decrease in the outflow of blood from the aorta, is itself the cause of left ventricular hypertrophy. . . .

Both Johnson and Traube agreed with Bright that the cardiac and vascular changes were secondary to the primary disturbance of kidney function.

The next important contribution to the subject was that of Gull and Sutton¹⁰ in 1872. After an exhaustive study, they concluded that there was a primary disease of the vascular system throughout the body characterized by a diffuse hyaline fibrosis, and that this condition was independent of renal disease. Their proof that marked cardiac hypertrophy and widespread capillary fibrosis could exist with varying degrees of nephritis stimulated the search for factors other than kidney disease as the cause of the cardiac hypertrophy. Further progress in the differentiation of hypertensive states had to await the development of clinical instruments for the measurement of blood pressures.

Mahomed,^{11, 12} using a crude method for determining blood pressures, pointed out for the first time in 1874 that there was a condition in which the blood pressure was elevated before there was any albuminuria or evidence of renal disease. He also attached great importance to the circulatory system in the origin of this disease, and maintained that the disease in the arterial system was really the cause of the albuminuria, rather than that the albuminuria was the cause of the vascular fibrosis.

Von Basch¹³ soon showed that elevated blood pressures were common, and with the aid of more precise instruments he accumulated measurements and observations that have formed the basis of the modern concept of essential hypertension. He also

observed that the blood pressure may be normal or elevated in severe circulatory failure, and that although palpation of the larger arteries may reveal no evidence of arteriosclerosis, the smaller vessels may be the site of considerable change. On the other hand, he did not understand the relation between hypertension and arteriosclerosis, for he believed that the blood pressure was invariably high in the presence of arteriosclerosis and that it was an accurate clinical index of arterial disease.

The clinical state of hypertension then drew the attention of physicians, including Huchard,¹¹ Sawada,¹² Allbutt¹³ and Pal.¹⁴ Huchard did not carefully distinguish between diffuse arteriosclerosis, as such, and essential hypertension, but Sawada, in 1904, demonstrated that the blood pressure was often normal in the presence of extensive arteriosclerosis. Influenced by this observation and by Mahomed's concept, Allbutt fostered the theory that hypertension was an independent condition. He clearly differentiated arteriosclerosis of the larger vessels from arterial hypertension or, as he called it, "hyperpiesia." Volhard and Fahr¹⁵ re-investigated kidney diseases in 1914 and differentiated vascular nephrosclerosis from primary renal disease. Primary hypertension, however, was not considered a separate clinical condition for a long time, although a few outstanding clinicians advocated this new concept.

While these relations were being clarified, the condition of the heart in patients with elevated blood pressures received increasing attention. Allbutt did much to crystallize the thought that hypertensive heart disease was a distinct clinical entity, with a course differing from that in nonhypertensive cases. He believed that the hypertensive heart failed when the strength of its hypertrophied muscle fibers was exhausted, and that after a certain degree of hypertrophy the heart had little capacity for recovery. Krehl¹⁶ and Huchard,¹⁴ on the other hand, stressed the importance of cardio-sclerosis or disease of the coronary arteries in the production of this type of heart failure. In this country, Fahr¹⁵ was one of the first to appreciate the clinical significance of hypertensive heart disease. He maintained that heart failure unassociated with chronic valvular disease was most frequently of this origin. Christian²¹ also stressed the importance of this form of heart disease.

In 1928, Bell and Clawson²² pointed out the high incidence of coronary sclerosis in hypertensive patients, and Levine and Brown²³ called attention to the frequency of hypertension in patients with coronary thrombosis. Murphy, Grill, Pessin and Moxon,²⁴ studying the same problem, found that more than 25 per cent of their cases of hyper-

tensive heart failure had gross coronary involvement. Thus, it became established that hypertensive heart disease was associated not only with cardiac hypertrophy but also with an increased incidence of coronary atherosclerosis.

Difference of opinion, however, concerning the relative importance of these factors still prevailed. We reinvestigated the problem, by comparing the anatomical findings in hypertensive and non-hypertensive patients with angina pectoris and congestive failure, and found that both angina pectoris and congestive failure occurred with less coronary sclerosis in hypertensive patients.²⁵⁻²⁶ Severe coronary disease, with occlusion of one or more vessels, was present in 90 per cent of normotensive patients with angina pectoris, whereas in the hypertensive group, coronary disease of this magnitude was present in only 55 per cent. A corresponding difference in the incidence of myocardial infarction in both groups was also demonstrated. Likewise, in patients with congestive failure, severe coronary disease was invariably present in the nonhypertensive cases, but was found in only 53 per cent of the hypertensive group. It appeared established, therefore, that factors other than coronary disease are also important in the mechanism of both angina pectoris and congestive failure associated with hypertension. Two factors known to be present in this condition are cardiac hypertrophy and increased cardiac work.

It has been suggested that cardiac hypertrophy interferes with nutrition of the heart muscle, because the number of capillaries remains unchanged in spite of the increase in muscle mass²⁷ and because oxygen diffusion is impaired in the hypertrophied muscle fibers.²⁸ Increased cardiac work is known to be important in angina pectoris associated with thyrotoxicosis and anemia. These two factors are present in most patients with hypertension, and their relative importance is probably related to the magnitude of the hypertrophy and the degree of hypertension present.

Since it was first demonstrated that atherosclerosis was increased in essential hypertension, many have held that atherosclerosis is due to the effects of the elevated tension on the walls of the arterial system. This concept appeared to be in harmony with the increased occurrence of atherosclerosis with age. Our²⁹ studies, however, have shown that the atherosclerosis found in patients with essential hypertension is unrelated to the elevated tension itself. The coronary arteries of patients with marked hypertension of renal origin, for example, did not show the increased incidence of atherosclerosis found in patients with essential hypertension. In patients with renal hypertension,

the degree of coronary sclerosis was the same as that in controls of the same age and sex. Likewise no relation was found between the severity of hypertension—as evidenced by blood-pressure levels and heart weights—and the degree of coronary sclerosis. These findings are in harmony with the experimental studies of Goldblatt,³⁰ who observed no increased atherosclerosis in his dogs in which experimental hypertension was induced.

* * *

It appears, then, that in the pathogenesis of hypertensive heart disease there are two coincidental yet independent phenomena. The first is the development of elevated blood-pressure levels that in time lead to cardiac hypertrophy and increased cardiac work, both of which demand additional nourishment for the myocardium. The second is the increased tendency toward atherosclerosis, especially of the coronary vessels, which interferes with cardiac nourishment and function.

REFERENCES

1. Weiss, S. The development of the clinical concept of arterial hypertension. *New Eng. J. Med.* 202:891-897, 1930.
2. Corvisart, J. N. *An Essay on Organic Diseases and Lesions of the Heart and Great Vessels*. 344 pp. Boston: Bradford and Read, Philadelphia: Finley, 1812.
3. Bertin, R. J. H. *A Treatise on the Diseases of the Heart and Great Vessels*. 449 pp. Philadelphia: Carey, Lea & Blanchard, 1833.
4. Hope, J. *A Treatise on the Diseases of the Heart and Great Vessels*. Second edition. 612 pp. London: W. Kidd, 1835.
5. Bright, R. The tabular view of the morbid appearances in one hundred cases connected with albuminous urine. *Guy's Hosp. Rep.* 1:380-400, 1836.
6. Bamberger, H. *Lehrbuch der Krankheiten des Herzens*. 459 pp. Wien: Wilhelm Braumüller, 1857.

7. Wilks, S. Case of Bright's disease, with remarks. *Guy's Hosp. Rep.* 8:232-315, 1853.
8. Johnson, G. *Lectures on Bright's Disease*. 152 pp. New York: G. P. Putnam's Sons, 1874.
9. Traube, L. *Gesammelte Beiträge zur Pathologie und Physiologie*. Vol. 2. 1130 pp. Berlin: August Hirschwald, 1871.
10. Gull, W. W. and Sutton, H. G. On the pathology of the morbid rare commonly called chronic Bright's disease with contracted kidney ("arterio-capillary fibrosis"). *Med.-Chir. Tr. N. S.* 37:272-326, 1872.
11. Mahomed, F. A. The etiology of Bright's disease or the prealbuminous stage. *Proc. Roy. Med. & Chir. Soc.* 7:263, 1874.
12. *Idem*: Some of the clinical aspects of chronic Bright's disease. *Guy's Hosp. Rep.* 24:363-436, 1879.
13. von Basch, S. *Die Herzkrankheiten bei Arteriosklerose*. 343 pp. Berlin: August Hirschwald, 1901.
14. Huchard, H. *Traité clinique des maladies du coeur et des vaisseaux*. Second edition. 892 pp. Paris: O. Doin, 1893.
15. Sawada, K. Blutdruckmessungen bei Arteriosklerose. *Deutsche med. Wchnschr.* 30:425, 1904.
16. Allbutt, C. *Diseases of the Arteries Including Angina Pectoris*. Vol. 1. 534 pp. London: Macmillan & Co., 1915.
17. Pal, J. *Gefäßkrisen*. 275 pp. Leipzig: S. Hirzel, 1905.
18. Volhard, F. and Fahr, T. *Die Brightsche Nierenkrankheit: Klinik, Pathologie und Atlas*. 292 pp. Berlin: J. Springer, 1914.
19. Krehl, I. *The Basis of Symptoms: The principles of clinical pathology*. Third edition. 517 pp. Philadelphia and London: J. B. Lippincott Co., 1916.
20. Fahr, G. E. Hypertension heart: the most common form of so-called chronic myocarditis. *J. A. M. A.* 80:981-984, 1923.
21. Christian, H. A. Speculations on some problems of cardiac failure. *South. M. J.* 20:28-32, 1927.
22. Bell, E. T. and Clawson, B. J. Primary (essential) hypertension: study of four hundred and twenty cases. *Arch. Path.* 5:939-1002, 1923.
23. Levine, S. A. and Brown, C. L. Coronary thrombosis: its various clinical features. *Medicine* 8:245-418, 1929.
24. Murphy, F. D., Grill, J., Pessin, B. and Moxon, G. F. Essential (primary) hypertension: a clinical and morphological study of three hundred and seventy-five cases. *Ann. Int. Med.* 6:31-53, 1932.
25. Davis, D. and Klainer, M. J. Studies in hypertensive heart disease. III. Factors in the production of angina pectoris. *Am. Heart J.* 19:198-205, 1940.
26. *Idem*: Studies in hypertensive heart disease. IV. Factors in the production of congestive failure. *Am. Heart J.* (in press).
27. Wearn, J. T. Vascular changes and their effect on the efficiency of the human heart. *Tr. A. Am. Physicians* 53:88-92, 1938.
28. Harsison, T. R. *Failure of the Circulation*. 396 pp. Baltimore: Williams & Wilkins Co., 1935.
29. Davis, D. and Klainer, M. J. Studies in hypertensive heart disease. II. The role of hypertension, per se, in the development of coronary sclerosis. *Am. Heart J.* 19:193-197, 1940.
30. Goldblatt, H. Studies on experimental hypertension. XII. The experimental production and pathogenesis of hypertension due to renal ischemia. *Am. J. Clin. Path.* 10:40-72, 1940.

PULMONARY FIBROSIS IN RAYNAUD'S DISEASE*

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RAYNAUD'S disease is usually defined as an intermittent spasm of the digital arteries brought on most frequently by exposure to cold or by emotional strain. It is always symmetrical in its manifestations.

The disease is not always confined to the digital arteries. Cases of Raynaud's disease have been reported in which intermittent blindness as well as transient hemiplegias occurred, presumably due respectively to spasm of the retinal and cerebral vessels.¹ As Raynaud's disease progresses, nutritional disturbances of the skin, manifested by fibrosis, take place. These sclerodermatous changes are not confined to the hands, but may frequently involve the skin of the ears, nose and face.

The manifestation of nutritional skin changes

and fibrosis over areas other than the skin of the fingers makes it seem probable that the vasospasm that causes Raynaud's phenomenon may also occur in the small arteries of the skin. The absence of acute circulatory phenomena in the skin may be due to the greater anastomosing circulation in the skin as compared with that in the digital arteries. However, when alterations in the walls of the small vessels take place and there is a permanently insufficient blood supply to the skin, the normal skin degenerates and is replaced by connective tissue.

The question naturally arises whether the same nutritional and subsequent fibrotic changes in the skin may not also occur in other organs of the body secondary to vascular changes similar to those in the digital arteries.

The following cases started with the typical phenomenon of Raynaud's disease, developed sclero-

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derma and showed pulmonary fibrosis in the absence of any other known etiologic factor. The fibrosis of the lungs ran a course much more rapidly progressive than is usually seen in other types of pneumofibrosis.

CASE REPORTS

CASE 1 Mrs S A, a 45-year-old woman had noted for about 12 years that on exposure to cold the middle fingers of both hands became dead white, then cyanotic and then red. This was associated with painful tingling and numbness of the finger tips. The attacks increased in frequency and severity, and after about 5 years the skin of the fingers and hands became permanently cyanotic and hard, the fingers could not be fully extended, the terminal phalanges were narrow and shortened and the nails were curved because of atrophy of the finger pulps. These sclerodermatous changes later involved the skin of the face which became smooth, firm, somewhat expressionless and diffusely pigmented. The feet were affected to a slighter degree. All arterial pulsations could be felt, in both the hands and the feet.

About 10 years after the onset of the disease during an examination because of a mild upper respiratory infection dullness accompanied by numerous fine crackling rales at the base of the left lung was found. The breath sounds were bronchovesicular, and there was increased fremitus to the spoken and whispered voice. The heart was displaced to the left. These signs had not been present on examination three years previously. The patient stated that for some time she had had dyspnea on exertion but no other symptoms. The past history revealed no etiologic factor for these pulmonary findings other than Raynaud's disease. The patient had had no cardiac disease and no history of unusual or repeated pulmonary infections or exposure to dust. Repeated examinations of the sputum were negative for tubercle bacilli and other significant organisms. Roentgenograms of the lungs showed increased markings and diffuse mottling in the lower half of both lung fields, and displacement of heart and mediastinal contents to the left owing to atelectasis.

During the next year, the dyspnea, cyanosis and x-ray changes increased progressively, so that in the fall of that year the patient had constant respiratory distress, even at rest. An acute episode of severe respiratory embarrassment pain in the right chest and marked cyanosis made hospitalization necessary. On admission the respirations were 70, the patient had slight fever, and there were many moist rales in both lungs from the angles of the scapulas down. The roentgenogram showed a pneumonic process at the right base. Oxygen therapy was started immediately and was continued until death, 46 days later. During the first few days the patient was reasonably comfortable while in the tent but she developed extreme dyspnea and cyanosis when taken out for even a short time. Later, however, respiratory embarrassment and cyanosis increased progressively, even while the patient was in the oxygen tent. Death was apparently due to asphyxia. Permission for a post mortem examination was not obtained.

CASE 2 Mrs B F, a 39-year-old woman, entered the hospital complaining of intermittent attacks of 13 years duration during which the skin of the face, abdomen and hands became blue, especially when exposed to cold. She also experienced pins-and-needles' sensations in her fingers. These attacks had increased in frequency during the several months prior to entry. For a few years the

patient had noticed shortness of breath and palpitation on exertion but had no other complaints.

Physical examination showed cyanosis of the face, tongue and hands especially the finger tips. There was some atrophy of the skin over the distal phalanges which appeared shortened. The fingers were stiff on attempted motion. Scattered under the skin of the hands and fingers were small irregular deposits of whitish material, which on chemical examination proved to be calcium salts. There was minimal narrowing of the retinal arteries. The blood pressure was 140/80. Examination of the heart, lungs and abdomen revealed no abnormalities. All laboratory determinations were within normal limits.

Roentgenologic examination of the chest showed exaggerated markings in the lower halves of both lung fields, the hilar regions were greatly increased in width and density, and the pulmonary conus appeared prominent. Roentgenograms of the hands showed partial destruction of the distal ends of some of the terminal phalanges and small calcified bodies in the soft tissues that were consistent with the diagnosis of calcinosis circumscripta. Roentgenograms of the feet, skull, femurs and genitourinary tract showed no deviations from the normal.

During the following months the symptoms progressed, and dyspnea and cyanosis were severe enough to require constant bedrest. During the few weeks prior to death, scattered moist rales developed at both bases, and slight edema of the ankles became evident with no other signs of cardiac failure. Digitalization was without effect on the edema, rales or dyspnea. The patient died from respiratory failure 20 months after admission. Permission for a post mortem examination was not obtained.*

CASE 3 Mrs E S, a 30-year-old woman had noticed for 3 years before admission to the hospital that her hands, fingers and feet felt numb and cold and turned blue on exposure to cold. The fingers, hands, elbows, knees and ankles were sore and stiff and the skin was noticeably dry. For 8 months the patient had experienced easy fatigability, anorexia and lack of ambition. Examination revealed stiffness of the wrist joints and thickened fingers, fixed in flexion. The skin of the fingers, hands and forearms was cold, dry, shiny and brownish; the finger tips were reddish purple. Similar changes were present about the ankles and toes. The skin over the face, neck and anterior chest was indurated and dry. Pulsations were palpable in all the peripheral vessels. The blood pressure was 142/94. The heart and lungs were normal except for a vital capacity of 1600 cc.

Roentgenologic studies showed marked osteoporosis of the bones of the wrists and hands. The chest plate revealed moderate increase in width and density of the hilar regions, and slight mottling and diminished radiance at both bases.

Bilateral dorsal sympathectomy was performed, after which the patient developed a mild pneumonic process at the right base, which subsided in a few days. Following a bilateral lumbar sympathectomy, she developed a pulmonary embolus in the left lower lobe. The symptoms of

stage of her illness began with chills, fever and cyanosis at both lung bases. The patient also developed a pericardial friction rub and died in a few days. Permission for post mortem examination was not obtained.

*We are indebted to Dr. Louis S. Liver for the history of Case 2 after the patient left the hospital and to Dr. Samuel L. Cargill for his permission to report Case 3.

These 3 cases have similar histories. They all started with typical manifestations of Raynaud's disease that continued for several years. Then nutritional changes of the skin occurred, and scleroderma developed; some time later the patients began to complain of dyspnea on exertion. Coincidentally, roentgenologic examinations showed fibrosis in the bases of the lungs. In no case were there any factors that would explain the etiology of the pulmonary condition. None of them had evidences of cardiac disease; there was no history of repeated pulmonary infections, or of exposure to agents that might cause pulmonary fibrosis. The rapidity with which the fibrosis progressed and the severity and rapid development of the respiratory difficulty were very unusual, and were not typical of any of the usual types of progressive pulmonary diseases. All three patients died within three or four years after the onset of the dyspnea. In the last case, an intercurrent infection was the immediate cause of death.

Even in cases of extensive fibrosis of the lung due to silicosis, the progress is not so rapid, nor is the dyspnea so marked as that seen in these cases.

We were unable, unfortunately, to get post-mortem evidence that vascular changes in the lungs were responsible for the pulmonary fibrosis in the above cases. However, the rapid development of the changes in the lungs and the marked dyspnea and cyanosis existing together with Raynaud's disease and scleroderma suggest that the pulmonary fibrosis was due to vascular disease in the lungs, similar to that which takes place in the skin in Raynaud's disease.

Matsui² published complete post-mortem findings in 6 cases of diffuse scleroderma that were clinically similar to the cases reported above with respect to the hands and fingers. He found typical changes in the small vessels of all the organs, with secondary fibrosis of the parenchyma. Thus the changes in the small branches of the pulmonary artery, similar to those found in the digital arteries, were accompanied by extensive fibrosis of the lungs. The changes in the vessels were characterized by hypertrophy of the musculature of the

media and fibrosis and thickening of the intima, with great narrowing of the lumen—changes characteristic of Raynaud's disease.

The situation in Raynaud's disease is thus analogous to that in thromboangiitis obliterans. Until recently the latter was regarded as a disease confined to the blood vessels of the extremities. In the last few years, however, after attention had been called to the fact that thromboangiitis obliterans may be a generalized vascular disease,³ numerous reports of cases of involvement of the systemic arteries by the disease have appeared in the literature. A recent report from the Mayo Clinic⁴ noted the occurrence of thromboangiitis obliterans in the coronary arteries, as well as a case of the disease in the pulmonary artery.

Raynaud's disease, as the foregoing histories suggest, should be regarded, not as being limited to the small arteries of the extremities, but as involving the small arteries of the lungs and possibly of other organs of the body. It is also possible that an occasional obscure case of pulmonary fibrosis is an exceptional example of Raynaud's disease without the typical manifestations in the digital arteries.

SUMMARY

Three cases are reported, all starting with typical manifestations of Raynaud's disease. In the course of several years, scleroderma developed, with subsequent fibrosis of the lungs of unknown etiology. The suggestion is made that the pulmonary fibrosis was secondary to changes in the small vessels of the lungs as a part of Raynaud's disease, and that this disease is therefore not limited to the digital arteries or the arteries of the extremities, but may involve the arteries of the lungs and possibly those of other organs of the body.

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REFERENCES

1. Anderson, R. G. and Gray, E. B. Spasm of the central retinal artery in Raynaud's disease: report of a case. *Arch. Ophthalm.* 17:662-665, 1937.
2. Matsui, S. Pathology and pathogenesis of universal scleroderma. *Mit. a. d. med. Fakult. d. k. Univ. zu Tokyo* 31:55-116, 1924.
3. Barron, M. E. and Linenthal, H. Thrombo-angiitis obliterans: general distribution of disease. *Arch. Surg.* 19:735-751, 1929.
4. Hausner, E. and Allen, E. V. Vascular clinics. VIII. Generalized arterial involvement in thrombo-angiitis obliterans including report of a case of thrombo-angiitis obliterans of a pulmonary artery. *Proc. Staff Meet., Mayo Clin.* 15:7-13, 1940.

CLINICAL NOTES

MENINGOCOCCEMIA

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MENINGOCOCCEMIA is a relatively rare cause of intermittent fever accompanied by a rash and may present a real problem in diagnosis. This fact, as well as the demonstration that small doses of sulfanilamide are inadequate in preventing a recurrence of temperature and rash, makes it seem worth while to add one more case to the growing literature of this disease, which in the past has been considered a clinical rarity.

The disease was first described by Solomon¹ in 1902. In 1931, Bunn and Fothergill² pointed out that the majority of cases had been reported in the foreign literature, only 19 being found in American journals. They reported a case in a child eight years old, who recovered after treatment with antimeningococcus serum. Since that time, each year four or more reports have appeared dealing with both the clinical and laboratory aspects of the disease.

Heinle³ points out that there are two main types of meningococcal septicemia. The first is acute and fulminating and is invariably fatal, the second is chronic and lasts many months, with spontaneous recovery in many cases. The latter are fortunately in the majority. Lambie⁴ reports a case that ran a self limited course of three and a half weeks. He believes that meningitis should be regarded as only one metastatic lesion of meningococcal septicemia.

An excellent clinical description is given by Carbone and Campbell,⁵ who report 33 cases from the literature and 3 of their own. The symptoms and signs in the order of frequency are rash, intermittent fever, arthralgia, chills, headache and myalgia. They point out, as do most writers on the subject, the difficulty of growing the organism, even in enriched mediums.

The fever differs from malaria in that the daily peak does not occur at the same hour.⁶ As a rule the patients do not appear toxic or acutely ill.⁷ When first seen, the patient is thought to be suffering from ordinary grippé with general malaise, fever and myalgia. Shortly afterward, in from one to three days, a macular rash appears, usually on the extremities. Although it is pink at first, it may later be purplish or even hemorrhagic. There may be arthralgia.⁸ The fever, rash and general

ized symptoms disappear in twenty four to forty-eight hours, only to recur at intervals of from one to four days. In the early stages, the disease is confused with measles, typhoid fever, Rocky Mountain spotted fever and malaria. Later the differentiation from gonococcemia may become difficult.

The chief laboratory problem is growing the organism from the blood stream. Serum agglutination tests may be necessary.⁷ The complement fixation test may be positive,⁶ a feature that is rarely mentioned in the literature.

The chief complication is meningitis, which usually occurs late. Endocarditis occurs in 10 per cent of the cases. Nephritis may develop, but is rare. Epididymitis is a not infrequent complication in men.⁷ The arthritis may go on to articular destruction and ankylosis.⁸ The Waterhouse-Friderichsen syndrome, owing to acute bilateral supratentorial apoplexy, is often caused by meningococcal septicemia, but is usually seen only in infants and young children.⁹

Until the advent of chemotherapy, treatment was limited to the use of antimeningococcus serum⁶ and fever therapy.¹⁰ However, in the last few years, dramatic cures have been reported with sulfanilamide¹¹ and sulphyridine. Dimson¹² favors the latter because of its quicker action and because a smaller dosage is necessary.

CASE REPORT

A 22-year-old unmarried woman while on Cape Cod on June 10, 1940, removed several ticks from her body, none of which had burrowed under the skin. Thirty-six hours later she had general malaise, chilliness and a temperature of 101°F, which lasted for 2 days. On June 16, 6 days later, the temperature again reached 101°F, and a maculopapular rash, which was hemorrhagic in spots, was present on the extremities. She was not toxic, and the physical examination was otherwise negative. On June 18, the rash was fading and the temperature was normal. On June 19, the temperature reached 102°F, general aching was present, and the patient complained of pain in the right knee. On June 20, the rash was more pronounced and had spread somewhat over the body. The macules could be blanched by pressure and were slightly raised and tender. The patient was referred to the Newton Hospital.

On June 20, the Widal test, Weil-Felix reaction, agglutination test for undulant fever and blood Hinton test were negative. The blood smear showed no plasmodia. A blood culture taken on June 22 when the temperature was 102°F, showed gram negative intracellular diplococci that fermented glucose but would not grow in milkose. At this time, a history of leukorrhea, present for several years, was obtained. The patient admitted possible exposure to a gonococcal infection, and a tentative diagnosis of gonococcemia was made. She was started on 40 gr of sulfanilamide a day. Vaginal smears on June 26 and 30 were negative for gram negative intracellular diplococci. On June 26, there was a recurrence of fever, with chilliness and rash, and localized swelling and redness of the right 2nd and 3rd metacarpophalangeal

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joints. Complement-fixation tests for gonococcus, done on June 27 and 28, were positive. Organisms were again grown from the blood stream on June 25. These did not grow on maltose for 10 days, after which fermentation was present, thereby establishing the diagnosis of meningococcemia. She was discharged after 6 days of sulfanilamide therapy.

On July 8, there was a recurrence of temperature of 103°F., with rash, sore throat and aching of the back and knees. The patient was readmitted to the hospital by Dr. Lewis I. Pilcher, and was seen by Dr. Chester S. Keefer, who made a diagnosis of chronic meningococcal septicemia and advised intensive sulfanilamide therapy, with a blood level of not less than 10 mg. per 100 cc. This was carried out for 7 days. On July 18, a blood culture was negative, and on July 20 the patient was discharged.

When seen on August 21, the patient had had no recurrence and was clinically well.

This case was characterized by intermittent fever, arthralgia, a macular rash and very little evidence of toxicity. The diagnosis was delayed by the slow growth of the organism in maltose and the positive gonococcal complement-fixation test, coupled with a history suggestive of venereal disease. The question of Rocky Mountain spotted fever was raised because of the history of tick exposure. Haverhill fever was considered before blood cultures were positive. Sulfanilamide in daily doses of 40 gr. for six days was inadequate for complete cure, which was accomplished by seven days of intensive sulfanilamide treatment.

SUMMARY

A case of meningococcemia that at first suggested gonococcemia because of the history and positive complement-fixation test is presented. Small doses of sulfanilamide were therapeutically ineffective, but the drug in doses sufficient to maintain a blood level of 10 mg. per 100 cc. for seven days effected a permanent cure.

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REFERENCES

1. Salomon, H. Ueber Meningokokkenseptikämie. *Erl. klin. Wchnschr.* 39:1045-1048, 1902.
2. Binns, J. F. and Fothergill, L. D. Chronic meningococcus septicemia. *New Eng. J. Med.* 205:536-539, 1931.
3. Heinle, R. W. Meningococcic septicemia: report of five new cases. *Arch. Int. Med.* 63:565-583, 1939.
4. Lambie, C. G. Persistent benign meningococcal bacteremia, with a report of a case. *M. J. Australia* 1:1058-1061, 1938.
5. Carbonell, A. and Campbell, E. P. Prolonged meningococcemia: report of three cases. *Arch. Int. Med.* 61:646-654, 1938.
6. Friedman, J. J. and Buchanan, J. A. Chronic meningococcemia. *New York State J. Med.* 39:1662-1664, 1939.
7. Appelbaum, E. Chronic meningococcus septicemia. *Am. J. M. Sc.* 193:96-108, 1937.
8. Schein, A. J. Articular manifestations of meningococcic infections. *Arch. Int. Med.* 62:963-978, 1938.
9. Kunstadter, R. H. The Waterhouse-Friderichsen syndrome. *Arch. Pediat.* 56:489-507, 1939.
10. Rosenblüth, M. B. and Stetten, De W., Jr. Meningococcus septicemia: treated by fever therapy. *New York State J. Med.* 38:1078, 1938.
11. Binns, J. F. and Clancy, J. J. Chronic meningococcemia promptly cured by sulfanilamide. *Am. J. Dis. Child.* 57:404-408, 1939.
12. Dimson, S. B. Chronic meningococcal septicemia treated with 2-(p-aminobenzenesulphonamido) pyridine. *Lancet* 2:424-426, 1938.

PNEUMOCOCCAL MENINGITIS SUCCESSFULLY TREATED WITH SULFATHIAZOLE AND ANTIPNEUMOCOCCUS SERUM*

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IN 1939, Fosbinder and Walter¹ described two new derivatives of sulfanilamide that gave promise of clinical usefulness. Since that time, sulfathiazole has been reported as being of value in the treatment of pneumococcal and staphylococcal infections, and this has been confirmed in our own experience. Recently, we have had an opportunity to administer sulfathiazole to a patient with pneumococcal meningitis with very encouraging results. Because a review of the literature fails to disclose a similar instance of its use, we are reporting the case.

CASE REPORT

A. L., a 50-year-old man, was admitted to the Ophthalmic Service on June 28, 1940, complaining of inability to see out of the left eye. He had had four abscessed teeth removed on May 5, 1940. Following the extraction, he felt quite well until he was stricken with pain in the left eye 3 days prior to admission. Examination at that time revealed an exquisitely tender eye, with pus in the anterior chamber. A diagnosis of acute purulent endophthalmitis, probably metastatic, was made. Expectant treatment failed to bring relief, and an enucleation was performed on June 30. No evidence of orbital infection was noted at operation. The postoperative course was satisfactory and without fever until the evening of July 6, when the patient complained of pain in the right side of the neck; the temperature at this time went to 103°F. by rectum. The sensorium became clouded, and the patient soon became very unco-operative, although not comatose.

Lumbar puncture disclosed a clear fluid under slightly increased pressure; it contained 600 leukocytes per cubic millimeter, of which 60 per cent were granulocytes. Culture of the fluid showed a luxuriant growth of Type 3 pneumococcus. Blood culture on the same day showed no growth.

Oral administration of sulfathiazole was begun at once; the initial dose was 4 gm., and subsequent doses of 2 gm. were given every 4 hours. Twelve hours later the patient was given 240,000 units of Type 3 antipneumococcus serum intravenously. The improvement was prompt and striking. Within 72 hours of the onset, the spinal fluid was sterile and the temperature reached normal. Chemotherapy was continued for 6 days, a total of 67 gm. of sulfathiazole having been administered.

A summary of the laboratory findings is given in Table I. Convalescence was uneventful except for an attack of lum-

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This study was aided by a grant made in honor of Craig Yeiser.

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bar pain on the 6th and 7th days of chemotherapy, this, in turn, was followed by a very minor degree of hematuria. Blood chemical determinations at that time showed not only an unusually high free concentration of sulfathiazole, but also a very high level of the conjugated drug. Following the discontinuance of chemotherapy, the pain promptly subsided and the hematuria gradually disappeared.

The pathogenesis of the meningitis in this case is very obscure. Cultures of the pharynx and the

middle therapy alone before serum was administered; combined treatment was instituted because of our uniformly discouraging results in the treatment of pneumococcal meningitis, and because of certain evidence that combined therapy may be indicated generally in Type 3 infections. It may be possible, however, that sulfathiazole diffused through the blood brain barrier to create a con-

TABLE 1 Summary of the Laboratory Findings

DATE	SULFATHIAZOLE DOSAGE	WHITE CELL COUNTS		CULTURES		SULFATHIAZOLE LEVELS*	
		BLOOD	SPINAL FLUID	BLOOD	SPINAL FLUID	BLOOD	SPINAL FLUID
		per cu mm	per cu mm			mg /100 cc	mg /100 cc
7 6			600	Negative	Pneumococcus (Type 3)		
7 7	11	14650	1150		Pneumococcus (Type 3)		Trace
7 8	12		746		Pneumococcus (Type 3)	4 7	1 5
7 9	12	7900	193		Negative	7 2	1 4
7 10	12		99		Negative	8 4	2 0
7 11	12	7550					
7 12	8		59			13 7	
7 13	2	14600			Negative	14 0	3 5
7 14		12900				12 8 (free)	
						9 4 (conjugated)	
7 15		13250				5 8 (free)	
						6 (conjugated)	
7 16		7300					
7 17			5	Negative		0 8	
7 22							
7 27		7100	5				

*Chemical determinations were made according to the method of Bratton and Marshall² using a sulfathiazole standard

teeth sockets yielded no pneumococci. Roentgenograms of the sinuses and air cells of the skull disclosed no focus of infection. Unfortunately, fluid from the hypopyon was not cultured; a culture from the left eye socket showed no pneumococci. The patient did not have pneumonia. Inasmuch as pneumococci are frequent causative agents of hypopyon, it is not unreasonable to suspect that the meningitis represented a late metastatic lesion from the endophthalmitis.

The employment of two specific agents in the treatment makes it impossible to evaluate either remedy. The patient was improving on sulfona-

centration in the spinal fluid that was equal to those in the blood stream that are frequently associated with bacteriostasis. Moreover, no serum or complement was introduced intrathecally.

SUMMARY

A patient with Type 3 pneumococcal meningitis recovered promptly after treatment with sulfathiazole and antipneumococcus serum.

REFERENCES

- 1 Foshander R J and Walter L A. Sulfanilamide derivatives of heterocyclic amines. *J Am Chem Soc* 61:2032 1939
- 2 Bratton A C and Marshall E K Jr. New coupling component for sulfanilamide determination. *J Biol Chem* 128:537-550 1939

MEDICAL PROGRESS

ALLERGY: WITH SPECIAL REFERENCE TO DRUG ALLERGY*

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THE current literature dealing with allergy contains an increasing number of reports of queer reactions to queer substances. There are various reasons for this. First, the principles of allergy are being recognized more and more, and the profession and the public are becoming "allergy conscious." Secondly, with the help of allergic principles, many lesions particularly those of the skin, that were formerly passed off as being of minor importance can now be recognized as having a real cause and are reported as such. And thirdly, modern progress, particularly in chemistry, has resulted in the development of a host of new substances encountered in industry, as well as in new forms of medical treatment. More of these new substances are appearing from time to time, and reports of reactions continue to be presented. It is therefore considered worth while to review the present knowledge of the subject.

The fundamental principles are not difficult to understand. The state of hypersensitiveness is acquired by certain people but not by everyone; and this fact raises the question whether the capacity to develop sensitiveness is in itself an unusual and distinct function or whether it is merely an exaggeration of a normal response. The arguments for and against each of these conceptions need not be reviewed here. The fact is that when the person who has the capacity to develop sensitiveness comes into repeated contact with a new foreign substance, he is likely to develop a hypersensitiveness to it. The nature of the foreign substance seems to be relatively unimportant, for as will be seen presently, sensitiveness may be developed to substances of such simple chemical structure as iodine, arsenic and aspirin, or to those of such complexity as egg-white and horse serum at the other end of the scale. The list contains substances of all chemical varieties between the two extremes.

Sensitiveness may arise in various ways and may take on various forms, perhaps in accordance with the mode of exposure. In general, there are two major groups.

The first is *local tissue sensitiveness*, which may develop without evidence of changes in the body as a whole. It is limited to one kind of tissue,

usually the skin, as shown by the fact that in poison-ivy dermatitis the patient can eat the leaves without symptoms, since his mucous membranes are not sensitive. Under the title of "contact dermatitis" a multitude of reports deal with variations in the application of the principles. In other cases, the sensitiveness may be of the mucous membranes rather than of the skin, and one may have lesions of the eye, the mouth (canker sores), the nose (hay fever) or the vagina, all without evidence of sensitiveness in other tissues, as might be shown by positive skin tests or by the presence of skin-sensitizing antibodies in the blood. Whether asthma can be due to a sensitivity localized in the bronchial mucosa is an interesting possibility. In this group of local tissue sensitiveness, skin reactions made by the scratch method are quite negative. Contact dermatitis has been known a long time. The patch test, which reproduces the lesion and confirms the diagnosis, was described by Jadassohn¹ in 1895, which was seven years before Portier and Richet² reported on "anaphylaxis," and eleven years before Von Pirquet³ discussed "allergy." As Sulzberger⁴ remarks, this early work is not often recalled.

The second major group is *general sensitiveness*, that is, a reaction of the whole body. In hay fever, asthma and certain types of dermatitis ("eczema"), the exciting factor, which occurs in dust or foods or drugs, is absorbed into the blood and thus reaches the shock organs in the nose, the bronchi or the skin. The sensitiveness can be transferred locally to normal persons by injecting the skin-sensitizing antibodies of the patient's serum. Skin tests are usually positive.

The relation between hay fever, asthma and flexural eczema of the typical allergic, or more properly called "atopic," varieties, and the less well-defined drug rashes, urticarias, general systemic reactions and blood reactions is not always clear, but at least one can say that they occur in only a small number of persons who are specifically sensitized and that the nature of the symptoms suggests that the process is general and not local. The distinction between reactions that are allergic and those that are toxic depends on whether they occur in only a few patients or quite regularly in all persons exposed to the drug. In other words, the

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question is, Does the reaction depend on some change in the particular patient, or is the drug poisonous for all? In a few cases of drug allergy, positive skin tests and skin-sensitizing antibodies have been observed. Whenever the skin is involved, the patch method of testing usually gives positive results; but when the skin is not involved, neither by the scratch nor by the patch

TABLE 1. *Drug Allergy.*

LOCAL TISSUE SENSITIVENESS	
Contact dermatitis (skin)	
Mucous membrane sensitiveness	
Eye (conjunctivitis)	
Nose (hay fever)	
Mouth (canker sores)	
Bronchi (asthma)	
Vagina (vaginosis)	
Fixed eruptions	
GENERAL SENSITIVENESS	
Atopy (hay fever (?), asthma, atopic eczema)	
Systemic reactions (including asthma)	
Dermatitis medicamentosa	
Urticaria	
Blood dyscrasias (agranulocytosis, purpura, aplastic anemia)	
Miscellaneous (migraine, joint pains, dysmenorrhea and so forth)	

method can the sensitiveness be demonstrated. The relation between the two major groups and their subdivisions is shown in Table 1, and the various points are considered in the following sections.

LOCAL TISSUE SENSITIVENESS

Contact dermatitis is common and may depend on any one of an almost indefinite number of drugs. Sulzberger⁴ gives a list of eight hundred different substances that he has used for patch tests in persons suspected of being sensitive to one or the other. The list is similar to that published in 1939 by Rostenberg and Sulzberger.⁵ On the last page of Sulzberger's paper, one notes, among other items, water colors, Whitfield's ointment, window sprays, oil of wintergreen, witch hazel, xylol, yellow oxide (a dye), zinc sulfate and Zonite, in other words, dyes, medicaments, household chemicals, cosmetics, industrial chemicals and patent medicines—the whole range.

Recent case reports are numerous. Downing's⁶ patient was a window glazier who became sensitive to the orthodichlorobenzene used as a wood preservative. A drop of the solution applied to the arm produced intense erythema and edema in two minutes. In Walter's⁷ patient, hexylresorcinol was applied externally each day for five months. Two years later, the drug was applied again and a severe local dermatitis resulted in vesicular, bullous lesions. Goodman⁸ observed positive patch tests in a patient with severe contact dermatitis who was poisoned by various local anesthetics. He found, however, that only those anesthetics with a para-aminobenzoyl base caused

reactions. No response followed when the amino group was in the meta or ortho position, and other cases have shown that the development of sensitiveness depends not only on the chemical constituents of the substances involved but also on the way in which they are arranged in the compound. Schwartz and Russell⁹ describe an extensive dermatitis in a patient who was found sensitive to the resin used for lining tin cans. So-called "can poisoning" is not uncommon. On the other hand, Henry¹⁰ found that his patient was sensitive to the celery oil in the contents of a can.

Mucous-membrane sensitiveness occasionally occurs, and cases must be looked for. In 1935, Parlato's¹¹ patient was a nun who developed corneal ulcers after exposure to sachets used in the church vestments. She gave a markedly positive skin test to orris powder so that her trouble was of general, rather than local origin. Pfeiffer's¹² patient was sensitive to Pontocaine, so that 2 drops of the 0.5 per cent solution in the eye resulted in the development of massive edema of the eyelids, face and parotid regions that came on in a few hours. Patch tests were positive. Somewhat similar is the case reported by Theodore,¹³ who found his patient sensitive to Larocaine. Parkhurst and Lukens's¹⁴ patient was sensitive to Butyn, and when a 2 per cent solution was dropped in her eye, both eyes became markedly swollen. Patch tests with Butyn and also with a solution of zinc sulfate were positive. In each of these cases, the sensitiveness of the eye was very marked, but one could hardly say that it was limited to this particular mucous membrane.

That vernal conjunctivitis is an atopic illness and not a local process is the conclusion of Lehrfeld and Miller,¹⁵ who studied 120 cases. Many positive skin tests with foods and drugs were found, and the eosinophils were high in both the blood and ocular smears.

In the vagina, local sensitiveness has been recognized. Kesten¹⁶ treated a woman for *Trichomonas vaginitis*, using a powder containing arsenic. In a few minutes, burning and itching developed and became intense, and were followed promptly by a red rash. Whereas the lesion was marked in the mucous membrane, it spread to the skin of the inner aspects of the thighs as well.

A local sensitiveness of the nasal mucosa is a possibility that might account for the fact that certain patients have hay fever but give no positive skin tests to pollens. Occasionally, eye tests made by dropping crude pollen into the conjunctival sac are positive, or further study shows that the skin tests, which were negative in the first years, become positive in later years, suggesting that the disturbance is quite local at first but later spreads

to involve the body as a whole. It may be that certain cases with asthma can be shown to have a similar mechanism dependent on a localized, perhaps "fixed," sensitiveness of the bronchial mucous membrane.

The so-called "fixed drug eruption" was, according to Sulzberger,⁴ described first by Brocq in 1885. Sulzberger recalls that Brocq observed a patient who developed sharply circumscribed, elevated, discolored eruptions whenever a dose of Antipyrine was taken by mouth; these lesions always recurred in the same spots. Here, then, is evidence not only that the skin as a whole may be sensitized, but also that some areas of the skin may be more sensitive than others. Sulzberger reports that in some patients, certain fixed areas will react to one drug whereas others will react to another drug. His patient had a lesion on the hand that flared up regularly when she took a dose of a barbiturate by mouth, and she also had a fixed area on her thigh, which reacted when she took phenolphthalein. The hand did not react to the cathartic, nor did the thigh react to the sedative. Sensitiveness was not only localized—it was highly specific. Meredith¹⁷ observed a thirty-nine-year-old woman who had two round inflamed areas on the neck and one on the thigh. In a series of experiments, it could be shown that any barbiturate, such as Allonal, Sedormid, Dial or Sodium Amytal,—the last being the worst,—could cause a flare-up in these particular areas. The literature has been reviewed by Wise and Sulzberger,¹⁸ and more recently by Abramowitz and Noun.¹⁹

GENERAL SENSITIVENESS

General sensitiveness is somewhat easier to understand, since the vast number of patients with so-called "atopy," that is, hay fever, asthma and atopic eczema, provide typical illustrations. The capacity to develop this type of sensitivity is inherited: skin tests are positive, and skin-sensitizing antibodies can be demonstrated in the blood. It is important to keep the group in mind as the more general effects of drug allergy are considered briefly from here on.

Systemic reactions from drugs are not unknown. In 1933, Short and Bauer²⁰ reviewed the literature on cinchophen hypersensitiveness. They found 41 cases and added 4 of their own. All were made sick by the drug, and 3 patients developed urticaria. In 1937, Boros²¹ described a patient who developed jaundice and later ascites after taking cinchophen. In 1938, Sugg²² collected 32 cases of cinchophen poisoning, 22 of which had evidence of liver damage; 10 of these patients died; 10

others had extensive skin lesions, and 2 died. The drug was toxic.

Avertin caused death in 7 cases reported by Beecher,²³ who discusses the differences between allergic reactions and toxic effects, emphasizing that severe reactions occur only in a few people and thus point to a change in make-up. More recently, Dolan²⁴ and Crane²⁵ have described the occurrence of sudden death following the intravenous administration of an iodine-containing dye, called Diodrast, used in urography. In hundreds of other cases, it has caused no trouble.

Acute asthma can be caused by drugs. The asthmatic patients sensitive to acetylsalicylic acid (Aspirin) form almost a special group, because they are always difficult to deal with. Objective tests with the drug are unsatisfactory; the skin test is negative. Several reports of such cases were summarized in 1937 by Prickman and Buchstein.²⁶ In the same group, but less common, are other cases. Martinaud²⁷ observed a fatal attack of asthma that came on when the nasal mucosa was washed with a solution of Butyn. An injection of quinidine caused angioneurotic edema of the lips and larynx, and the next dose caused urticaria, shock and death, in a patient reported by Breu and Zollner,²⁸ the only case of quinidine poisoning in the literature. Another report is that of the McCastors,²⁹ who in five days after the first dose injected sodium morrhuate into the varicose veins of a thirty-year-old man. Suddenly he turned pale, then became cyanotic and collapsed, but with artificial respiration, epinephrine and Coramine he revived slowly. In another case, a similar though less violent reaction followed injection of sodium morrhuate into a hydrocele. The authors emphasize, however, that these were the only reactions in a series of twenty-five hundred injections. Two industrial chemicals are reported as a cause of asthma. Card's³⁰ patient was sensitive to the chromium used in a plating factory, and Kern's³¹ patient was sensitive to phthalic anhydride, a dye made from naphthalene.

Dermatitis medicamentosa is an old term that appears in many textbooks, and under it the generalized rashes due to bromides, iodides and arsenic salts are often described. In the literature up to 1937 Seymour³² found reports of 14 cases in which the local application of iodine had caused severe generalized eruptions; 7 of these were fatal, and he added another case. In 1937, Beijerinck³³ added a sixteenth, and also fatal, case of so-called "ioderma" with extensive generalized dermatitis caused by the injection of 1 gm. of potassium iodide daily for fourteen days.

Fanburg³⁴ has described a patient with exfolia-

tive dermatitis due to naphthalene on clothes stored in a moth proof closet.

In 1932, Bullen, Francis and Parker³⁵ reported 2 cases in which the ingestion of ephedrine caused the development of a generalized dermatitis followed by desquamation, and the next year Scheer and Keil³⁶ reported on scarlatiniform eruptions after cocaine. Gelfand³⁷ observed a woman who had marked generalized dermatitis from the application of a hair tonic and dandruff remover, and Settle³⁸ described the case of a young man whose extensive skin lesions were due to quinine. Baker and Brunsing³⁹ observed the sulfocyanates as a cause of dermatitis, and Brandt⁴⁰ discovered that the recurrent eczema in a forty five year-old woman came and went as her digitalis was prescribed or omitted.

The reactions to arsphenamine are of more practical importance. They occur oftener during the first course of treatment, and thus may depend more on the toxicity of the drug than on the allergy of the patient. Dermatitis is a contraindication to further treatment—at least with the particular preparation that caused it. Schoch, Alexander and Long⁴¹ have recently collected a series of cases and have shown that in most of them, treatment could be tolerated without further trouble. They suggest that the sensitiveness is directed not to the arsenic itself but to the particular chemical complex of which it is but a part. The Herxheimer reaction is said to be due to the flare up of the syphilitic lesion, like the so-called "provocative Wassermann reactions" in vogue some years ago. It may also be a form of local allergy. Nitritoid crises are immediate reactions with flushing of the skin, palpitation, collapse and sometimes asthma from edema of the bronchial mucosa, which come on suddenly, immediately after or often during the actual injection of arsenicals. Since these reactions occur in only a few patients, one may assume that allergy plays a part. They provide another illustration of the acute systemic responses described above.

Comparative studies of similar phenomena are as useful in allergy as in chemistry. Professor Sanger, who used to lecture in elementary chemistry at Harvard College, demonstrated that the physical and chemical properties of the elements varied in a rather orderly fashion in accordance with their atomic weights, and he predicted correctly that several blanks in his large periodic table would be filled in. And so it is with drug allergy. The sulfanilamide drugs have complex formulas, they produce severe general reactions occasionally, and now that they are being used more and more for purely local treatment, local contact dermatitis can be almost expected; so far,

however, I have not seen them. Toxic reactions, on the other hand, have been reported frequently, especially after later doses, when the drug had been repeated in a new and separate course of treatment, and deaths have occurred. Long and Bliss⁴² reviewed the literature up to 1939. They did not mention local reactions, but two reports (Tedder,⁴³ Hallam⁴⁴) lay stress on photosensitivity, which gave rise to extensive skin lesions in patients who had taken sulfanilamide or sulfapyridine and then were exposed to the sun or to an ultraviolet lamp. In these cases, the reaction was of a special type and consequently more toxic than allergic, even if observed in only a few of many patients.

Urticaria may be due to drug allergy. Indeed, urticaria and erythema multiforme are often part of the severe systemic reactions described above. Urticaria may also precede and be a part of generalized skin reactions. Reports of pure urticaria from drugs alone are not common. One difficulty is that whereas salicylates, barbiturates, morphine, iodine and phenolphthalein have been suspected as the cause of urticaria,—since rashes appeared when the drugs were given and cleared when they were withdrawn,—other factors are always hard to control. There is no doubt, however, that drugs of any sort are quite capable of causing hives.

Blood dyscrasias comprise another chain of symptoms that depend on a generalized sensitiveness of the body. Primary granulocytopenia (agranulocytosis) was first described in 1922 by Schultz,⁴⁵ but was first recognized as being due to drug poisoning by Squier and Madison⁴⁶ in 1933. In 1935, Hunter⁴⁷ reviewed the literature completely and pointed out that in most cases there was a story of previous use of the drug, and an interval before the second use, which caused the severe attack. The triad of first dose, interval and second dose may be compared with the anaphylactic experiment. In 1936, Dameshek and Colmes⁴⁸ were able to combine amidopyrine with serum to make a drug-protein linkage and thus to substantiate the role of allergy as the background for agranulocytosis. Between 1934 and 1938, cases sensitive to amidopyrine were reported with some frequency. Since then, the reports have been fewer, evidently because the dangers have been recognized and precautions in the way of careful following of the blood picture have been instituted.

Purpura from drugs is not uncommon, and the literature has been reviewed by Falconer and Schumacher⁴⁹ and by McGovern and Wright.⁵⁰ Sedorimid (allylisopropyl acetylcarbimide) seems to be a common cause, for it is reported several times

in recent literature. Purpura has followed the use of gold and arsenic compounds, as described by Hudson,⁵¹ and was caused by quinine in the case reported by Beiglböck.⁵²

Aplastic anemia may likewise be due to an allergic reaction caused by drugs. It has been found to follow the use of neoarsphenamine. Kadin⁵³ reviews the literature and adds 3 cases of his own.

It is very hard to determine why in certain people allergy causes a lesion of the bone marrow affecting the white cells, whereas in others it results in a disturbance of the blood platelets. One can speculate on the variations in the sensitivity of certain parts of the blood-forming mechanism and compare them with the different forms of contact dermatitis,—a sensitiveness of the skin in general, and the fixed drug eruption, in which only a portion of the skin is affected,—but there is no real knowledge of the subject.

Certain *miscellaneous diseases* deserve mention. Headache (migraine), joint pains and dysmenorrhea have been described as due to specific foods, but there is no report that incriminates drugs as a definite proved cause of these common symptoms. The possibility is included here merely as a suggestion and with the expectation that this blank also will be filled in. Sensitivity to hormones—insulin and liver and pituitary extract—occurs in occasional cases and rests quite firmly on a basis of allergy. Guinea pigs have been sensitized to crystalline insulin by Berstein and his associates.⁵⁴ Certain patients may be sensitive to the insulin alone, just as other patients appear to be sensitive to the animal from which the insulin was obtained and are relieved of trouble when the type of insulin is changed as from beef to hog. Similarly, in pituitary extracts, Simon and Ryder⁵⁵ found that sensitiveness depended on an organ-specific rather than a species-specific quality of the material.

DISCUSSION

The principal object of this brief review has been to call attention to the subject of drug allergy. It is not a very common disease, but it occurs often enough to be considered whenever a queer reaction occurs and results in a clinical picture that does not quite fit a recognized disease. One should think of the possibility that such a reaction depends on a hypersensitiveness to a queer substance: perhaps a drug, or perhaps some special chemical substance associated with home or occupation. Also, it is evident that drugs may be the principal cause of such definite conditions as asthma, urticaria, purpura, and agranulocytosis.

Another object of this review has been to call

attention to the multiplicity and the variety of reactions that drugs can produce, and then to arrange them in some sort of order so as to show the relation of one to the other and the relation between them and the better known clinical manifestations of allergy, like hay fever and asthma. It is emphasized that a hypersensitiveness to drugs may take on different forms and may result in a variety of different syndromes.

Finally, it appears that a study of the reactions to drugs is of considerable interest in its bearing on the reactions to other substances, especially the proteins and the pollens. The study of contact dermatitis is of particular importance because it suggests that sensitiveness may be localized to certain tissues or may at least be much more marked in one tissue than in another. This idea is similar to Coca's conception of a "shock organ," but the present emphasis is on the mechanism of the reaction, which is localized and results from direct local contact and consequently differs from the mechanism of other reactions, which, in turn, are more generalized and develop from contact with the specific substances through the blood stream.

This conception of local tissue hypersensitiveness needs much more study. The cases of contact dermatitis support the idea quite well, but when one tries to apply the same conception to the study of the mucous membrane, good support is hard to find. On the other hand, it is true that among hay-fever patients, there are some whose symptoms are typical, whose tests of the skin are quite negative, but who do react when pollen in crude dry form is dropped into the eye. Here is real evidence of a purely local process. The understanding of the problem of contact dermatitis becomes easier when that of hay fever is understood, and vice versa. Incidentally, is not ragweed hay fever in the nose of one patient and ragweed dermatitis of the face and wrists of another evidence of the varying predisposition of different local tissues? In this reaction, however, the chemical difference between the oleo resin, which can penetrate the skin, and the protein, which is soluble in the nasal secretion, may be significant. One's outlook must always be as broad as possible, so that one set of circumstances can be compared with the other, with profit to both.

Meanwhile, nothing has been said concerning the treatment of drug allergy. It should almost go without saying that treatment is synonymous with the diagnosis, which depends on two factors: first, thinking of the possibility, and secondly, studying the history. Just as in the study of hay fever and asthma, the dates and the circum-

stances of the attack give the clues by which the good detective can find the answer. Skin tests, especially by the patch method, are useful, but are positive only when the skin itself is involved. Drug allergy gives further evidence that clinical sensitiveness can exist even when the skin tests are negative

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REFERENCES

- Jadassohn J. Zur Kenntnis der medikamentösen Dermatosen. *Verhandl d deutsch Dermat Gesellch* 5 103 129 1935
- Porter P and Richet C. De l'action anaphylactique de certains venes. *Compt rend Soc de biol* 54 170-172 1907
- von Paquet C. Allergie. *München Wchnsch* 53 1457 1906
- Sulzberger M B. *Dermatologic Allergy An introduction in the form of a series of lectures* 540 pp Springfield Illinois Charles C Thomas 1940
- Rosenberg A Jr and Sulzberger M B. A list of substances for patch testing and the concentrations to be employed. *J Invest Dermat* 2 93 117 1939
- Downing J G. Dermatitis from orthodichlorobenzene. *J A M A* 112 1457 1939
- Waller C W. Idiosyncrasy to hexylresorcinol. *J A M A* 104 1897 1935
- Goodman M H. Cutaneous hypersensitivity to the procaine anesthetics: correlation of hypersensitivity with chemical structure. *J Invest Dermat* 2 53 66 1939
- Schwarz L and Russell J P. Occupational dermatitis from handling resins in linens. *J A M A* 115 448 1940
- Henry S A. Further observations on dermatitis due to eucalyptus leaf oil. *Brit J Dermat & Syph* 50 342 351 1938
- Parlato S J. Corneal ulcers due to a common allergen. *Arch Ophthalm* 14 58 59 1935
- Pfleiderer R L. Hypersensitivity to penicillin. report of case. *Arch Ophthalm* 18 62 64 1937
- Theodore F H. Hypersensitivity to larcaine. *Arch Ophthalm* 20 476 1938
- Pathurst H J and Lukens J A. Dermatitis due to butyrol. *J A M A* 112 837 1939
- Lehrfeld L and Müller J. Additional research on vernal conjunctivitis. *Arch Ophthalm* 21 639 646 1939
- Kesten B M. Arsenical dermatitis produced in treatment of Trichomonas vaginitis: report of five cases. *Arch Dermat & Syph* 38 198 1938
- Meredith F L. Reactions to certain barbiturate derivatives. *J A M A* 102 2099, 1934
- Witt, F and Sulzberger, M B. Drug eruptions. I. Fixed phenol-like eruptions. *Arch Dermat & Syph* 27 549 567 1933
- Abramowitz E W and Noun M H. Fixed drug eruptions. *Arch Dermat & Syph* 35 875 892 1937
- Short C L and Bauer W. Cinchophen hypersensitivity: a report of four cases and a review. *Ann Int Med* 6 1449 1464 1933
- Boros E. Hay fever and asthma during and after jaundice: ascribed due to cinchophen poisoning. *J A M A* 109 113 115 1937
- Sugr E S. Acquired sensitivity to cinchophen: report of six cases and a review. *Am J Med Sc* 195 473-479 1938
- Beecher H B. Fatal toxic reactions associated with bromethanol anesthesia. *J A M A* 111 122 123 1938
- Dolan L P. Allergic death due to intravenous use of diodast: suggestions for possible prevention. *J A M A* 114 138 1940
- Crane J J. Sudden death following intravenous administration of diodast for intravenous urography. *J Urol* 42 745 748 1939
- Priekman L E and Buchstein H F. Hypersensitivity to acetylsalicylic acid (aspirin). *J A M A* 108 445 451 1937
- Marrinaud M. Crise d'asthme mortelle au cours d'une anesthésie locale par bad-carbonage de la muqueuse avec une solution de butylène. *Anesth et analg* 1 199 207 1935
- Breu W and Zollner S. Chinidin als Antigen. *Wien klin Wchnsch* 53 524 527 1940
- McCastor J T N and McCastor M C. Reaction to sodium morrhuate injections for varicose veins and hydrocele. *J A M A* 109 1499 1937
- Card W I. A case of asthma sensitive to chromates. *Lancet* 2 1348 1933
- Kern R A. Asthma and allergic rhinitis due to sensitization to phthalic anhydride: report of case. *J Allergy* 10 164 1939
- Seymour W B. Poisoning from cutaneous application of iodine: a rare aspect of its toxicologic properties. *Arch Int Med* 59 952 966 1937
- Beijerschen C W. Weigens voorkomende verschijnselen van ernstigen aard bij het gebruik van joodkali. *Nederl tijdschr v geneesk* 81 5333 5341 1937
- Fanburg S J. Exfoliative dermatitis due to naphthalene: report of eruption resembling mycosis fungoides. *Arch Dermat & Syph* 42 53 58 1940
- Bullen S S, Francis N and Parker J M. Dermatitis med camentosa due to ephedrine. *J Allergy* 3 485 488 1932
- Scheer M and Keil H. Skin eruptions of codeine. *J A M A* 102 908 910 1934
- Gelfand H H. Hypersensitivity to arsenic dermatitis from Liquor Arvon. *J Allergy* 7 254 260 1936
- Settle R G. Dermatitis med camentosa due to quinine. *J A M A* 106 1861 1936
- Baker T W and Brunsing L A. Dermatitis med camentosa resulting from administration of sulfonylureas in the treatment of hypertension. *J A M A* 105 549 1937
- Brandt R. Ekzem infolge Ueberempfindlichkeit gegen D-galactose purpurea. *Wien klin Wchnsch* 50 1525 1937
- Schoch A, Alexander L J and Long W E. Mapharsen in the treatment of lorry patients following arsenical dermatitis. *Arch Dermat & Syph* 42 919 932 1940
- Long P H and Bliss E. *The Clinical and Experimental Use of Sulfonamide Sulfapyridine and Allied Compounds* 319 pp New York The Macmillan Co 1939
- Tedder J W. Toxic manifest. *Arch Dermat & Syph* 42 919 932 1940
- Hallam R. Severe skin and mucous membrane reaction to M & B 693 and ex. *J Clin Pathol* 1 559 1939
- Schultz W. Ueber eigenartige Halskrankungen. *Deutsche med Wchnsch* 48 1495 1497 1922
- Madson P W and Squier T L. Primary granulocytopenia after administration of benzene chain derivatives. *J A M A* 101 706 1933
- Humer F T. Drug or protein allergy as a cause of agranulocytosis and certain types of purpura. *New Eng J Med* 213 663 674 1935
- Dameshek W and Colmes A. The effect of drugs in the production of agranulocytosis with particular reference to amidopyrine hypersensitivity. *J Clin Investigation* 15 85 9 1936
- Falconer E H and Schumacher I C. Purpura haemorrhagica due to ingestion of sedorm d (allyl isopropylacetylcarbamide): experimental observations and report of case. *Arch Int Med* 60 122 137 1940
- McGovern T and Wright I. Purpura haemorrhagica following the use of sedorm d. *J A M A* 112 1687 1939
- Hudson E H. Purpura haemorrhagica caused by gold and arsenical compounds. *Lancet* 2 74 77 1935
- Beiglböck W. Ein Fall von thrombopenischer Purpura bei echter Glomerulonephritis. *Zentralbl f klin Med* 131 308 316 1937
- Kahn M. Aplastic anemia following the use of neoparsphoamine. *Arch Dermat & Syph* 37 787 796 1938
- Berstein C Jr, Karsner J B and Turner W J. Studies on anaphylaxis with insulin. *J Lab & Clin Med* 23 938 944 1938
- Simon F A and Ryder C F. Hypersensitivity to pituitary extracts. *J A M A* 106 512 515 1936

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27161

PRESENTATION OF CASE

First Admission. A fifty-three-year-old housewife entered the hospital complaining of dysmenorrhea.

The patient had been well until seven years previously, when her normal periods became irregular. Each year for the next three she suffered four attacks of transitory but severe lower abdominal pain, which occurred on the third day of what appeared to be a normal period. The pain was relieved in a short time by the onset of rather pronounced vaginal bleeding, which lasted several days. Four years before admission the menstrual periods became more regular, and the patient noticed hot flashes of decreasing severity. Two years later another attack of abdominal pain occurred, which was relieved by the onset of bleeding and the passage of "tissue"; no further attacks of this nature had appeared, but menstruation became more irregular and scant and generalized weakness came to the fore. A year and a half before admission the patient had a normal menstrual period. Six months prior to entry marked the onset of a brownish, odorless vaginal discharge, with occasional bright-red streaking, accompanied by a dragging sensation in the pelvis, and low backache; these symptoms persisted and were present at the time of admission. In addition the patient noticed that her hair was becoming dry and sparse, and that frequent headaches occurred that were more noticeable in the morning. Three months before admission she suffered an attack of upper abdominal pain, which lasted four days and was accompanied by nausea, loose yellow stools and "darkening" of the skin. Her physician could not detect jaundice, and there was no visible change in the urine. A bland fat-free diet was instituted, and the attack was not repeated; the patient had never liked fatty food and was troubled by "gas on the stomach." Furthermore, she stated that she had shaved once a day for "years," had lost weight in the past few months, and had noted stinging pain in the fingers and toes for an undisclosed period.

The patient had five children who were well; she had had three miscarriages. Seventeen years

before entry, a uterine suspension had been performed at another hospital.

On examination the patient was well developed, somewhat obese, and in no acute distress. The hair of the scalp was dry and receding, and there was facial hirsutism; the skin appeared atrophic. The heart, lungs and abdomen were negative apart from a mid-line surgical scar between the umbilicus and symphysis pubis; the blood pressure was 220 systolic, 100 diastolic. Pelvic examination revealed an enlarged clitoris with a relaxed perineum. The cervix was freely movable, and the fundus was normal in shape, but slightly enlarged. The vaults and adnexa were clear. Examination of the nervous system and eyes was negative except for a mild vascular sclerosis of the retinal vessels.

The temperature, pulse and respirations were normal.

Examination of the urine was negative. The blood showed a red-cell count of 4,940,000 with a hemoglobin of 94 per cent, and a white-cell count of 8400. The nonprotein nitrogen of the blood serum was 19 mg. per 100 cc. A sugar-tolerance test using 50 gm. of glucose showed a fasting blood sugar of 90 mg. per 100 cc., in half an hour 143 mg., in one and a half hours 204 mg. and in three hours 171 mg. The insulin-glucose-tolerance test showed slight insulin resistance. A blood Hinton reaction was negative, and a phenolsulfonephthalein test was normal. The cervical culture was negative for beta-hemolytic streptococci. Assays for 17-ketosteroids on two occasions gave values of 3.9 and 5.5 mg. in twenty-four-hour urine specimens.

X-ray studies of the chest were negative. A Graham test and intravenous pyelogram showed normal gall bladder and kidneys. Air injection revealed no enlargement of the adrenal glands.

An electrocardiographic recording showed a normal rhythm with a rate of 80 and a PR interval of 0.15 second. There was slight right-axis deviation and slight inversion of T₃.

On the third hospital day, a pelvic examination under ether and a dilatation and curettage were performed. The cervix had apparently been amputated at a previous operation, and it was found that firm adhesions had formed across its mouth which required division before the os could be found. The fundus was of average size, and 11 cm. in depth; the vaults were clear, and no masses were palpable in the flanks. Curettage yielded three fragments of endometrial tissue resembling endometrial polyps; elsewhere the interior of the uterus was smooth. Pathological examination of these fragments revealed chronically inflamed cervix

polyps, no endometrial tissue was identified. The patient was discharged three weeks after admission.

Second Admission (six months later) The patient remained well until three months after discharge, when slight vaginal bleeding reappeared. It was bright red, sometimes had a slightly unpleasant odor, and occurred at intervals of two or three weeks, lasting two to seven days. At this same time she suffered from transient attacks of nonradiating lower abdominal aching and soreness that coincided with the bleeding or was independent of it. One month before admission she visited the Out Patient Department, and the examiner believed a mass to be present in the left vaginal vault. At the time of admission, the patient stated that her head felt full and thick and that her memory was poor.

Physical examination was as before, with the following additional and contributory findings. The skin was oily, with a generalized mild acne. The blood pressure was 180 systolic, 115 diastolic. There were tenderness and slight spasm in both lower quadrants of the abdomen. The vagina contained blood, but the degree of tenderness in both vaults prevented an adequate examination.

On the third hospital day an operation was performed.

DIFFERENTIAL DIAGNOSIS

DR MAURICE FREMONT SMITH. It may be well to start off by pointing out that this woman was perfectly normal up to the time of the menopause. She had normal periods and had had five children. That is satisfactory evidence that she was, from the endocrinologic point of view, normal. She began having irregular periods at the age of forty-six, which is a normal time for the onset of the menopause. She had attacks of lower abdominal pain occurring on the third day of bleeding and relieved after the bleeding got underway. The chief complaint simulates dysmenorrhea. Of course, unless one uses the term "dysmenorrhea" to include all painful bleeding, this is not dysmenorrhea. Dysmenorrhea characteristically occurs early in life, rarely when a person has had a number of children. In fact, to have children is one of the best treatments of dysmenorrhea. It does not start at this age. This was painful bleeding, and should be put in the group with ectopic pregnancy, miscarriage, endometriosis and pelvic inflammatory disease, all of which produce pain with bleeding but are not what we term "dysmenorrhea." The cause of this painful bleeding is, I think, adequately explained by the later findings. The cervix having been amputated, scar tissue had grown over the end, and

when she menstruated, she bled into the uterus, the uterus tried to empty itself and could not; the patient had the same sort of pain that occurs with threatened miscarriage. When blood passed, the pain was relieved.

Four years before admission the periods became more irregular, and the patient had hot flashes, which, again, are perfectly normal menopausal symptoms. The hot flashes show that the pituitary gland was working, putting out follicular stimulating hormone, and an assay would have shown that follicle stimulating hormone was present. The hot flashes grew less frequent. I think that was probably normal, as she adjusted herself to the increased follicle stimulating hormone.

Two years before admission the patient complained of generalized weakness. That may be an important symptom to remember. At fifty-one she had a so called "normal period." In other words, she had bleeding without pain and may have had what might again be normal—a period of anovulatory bleeding coming once after the beginning of the menopause. Six months later she had discharge, with bright red streaking. Discharge after the menopause naturally brings up the question of carcinoma of the uterus. I think we can quickly dispose of that, however, because a thorough ether examination and curettage showed an atrophic endometrium, a few cervical polyps but certainly no cancer of the fundus, which would be the type of cancer expected at this age. The patient also had headaches, which we must remember, and she had sparse hair, to which I am unable to attach any significance. She had this queer attack of upper abdominal pain and yellow stools, with no apparent jaundice, and later she showed a diabetic sugar curve. She might have had an attack of mild, acute pancreatitis. She apparently did not have what one would first think of,—gallstones,—because she had a negative cholecystogram. Of course one can have gallstones in the presence of a negative cholecystogram, but she had no jaundice and no further attacks, and we either have to leave it unexplained or consider that she had an attack of pancreatitis.

The patient had shaved once a day for years. It would be helpful to know whether the hirsutism came on at a specific time in adult life or whether it fell into the very much larger group of hirsutism that has no endocrinologic basis. In 90 per cent of cases, hirsutism comes on at about the age of puberty and is due to disease of the hair follicles, which respond excessively to the normal steroids of the body. The end organ is at fault, not the endocrine glands. On the other hand, hirsutism can be evidence of a masculinizing process, but I think the fact that she shaved for years prob-

ably throws it into the larger group of congenital hirsutism.

The stinging pain in the toes and fingers, I cannot comment on.

As to the physical examination, there are some very important points. The patient was obese; the hair of the skull was receding; she had facial hirsutism. She had an atrophic skin, a high blood pressure and evidence by electrocardiogram of coronary arteriosclerosis. She had an enlarged clitoris. There was nothing abnormal in the vaults. These symptoms suggest Cushing's syndrome. We should like to know whether she had any osteoporosis. We have no x-ray films of the bones, but in Cushing's syndrome obesity is present, in addition to striae,—which are not mentioned here,—hypertension, arteriosclerosis, and a diabetic type of sugar curve.

Let us for a moment talk about the sugar curve. There was a glucose-tolerance curve of the diabetic type, and then we are told that there was slight insulin resistance. In ordinary diabetes we have, of course, a diabetic curve. If insulin is given, the curve is lowered. If one gives an insulin-glucose-tolerance test in which the insulin and glucose are balanced, one gets a rather flat curve. The sugar does not go up very high. In such a case the insulin is effective. In diabetes the reason that the sugar is high is that there is lack of insulin. We have been taught that insulin increases the tissue utilization of sugar. Soskin* says that in diabetes the tissue use of sugar is perfectly normal and that insulin acts by slowing down the production of sugar from the liver (which is constantly putting out sugar into the blood), but wherever insulin acts in diabetes, the insulin is effective on the blood sugar. There are two other conditions, however, in which insulin is not effective. With an overactivity of the eosinophilic cells of the pituitary gland, there is an overproduction of the hormone that inhibits insulin—the glycotrophic hormone of the pituitary. If a glucose-tolerance test is performed and insulin is given at the same time, the insulin is inhibited by the pituitary hormone and is not active. Therefore, the curve is much as it was originally—very little influenced by the insulin. The curve approaches the diabetic curve, and the insulin is not effective. Another condition in which insulin does not change the diabetic curve is hyperactivity of the adrenocortical cells, which is thought to be the physiologic explanation of Cushing's disease. In such cases the adrenocortical cells produce a hormone that breaks down protein in the body into sugar very rapidly. There is thus an overproduction of sugar,

and the insulin that is added—there being enough insulin in the body anyway—does not affect the glucose-tolerance curve.

Going back to Cushing's disease for a moment, Cushing's disease is due to an overactivity of the cortical cells of the adrenal glands. It was originally described as a basophilic tumor of the pituitary gland, the latter stimulating the adrenal glands to the production of the adrenotropic hormone, which, as previously mentioned, breaks down protein into sugar. On the other hand, some cases of Cushing's disease show no tumor of the pituitary gland. Some of them simply show hyperplasia of the adrenal glands, and in others Cushing's syndrome may occur with cancer of the adrenal glands. In all these cases, there are questionable compensatory changes in the pituitary gland. Apparently Cushing's syndrome can occur either as a primary condition in the adrenal glands, primary overactivity or as a secondary overactivity caused by a basophilic tumor of the pituitary gland. As I have said, many of these physical signs are consistent with Cushing's disease, as is the glucose-tolerance curve and the response to insulin. On the other hand, there are three things that do not fit in with Cushing's disease: The patient was still bleeding, and in Cushing's disease amenorrhea is one of the outstanding symptoms; she had an enlarged clitoris, which is not found in Cushing's disease—it does produce hirsutism without virilism; and she had low 17-ketosteroids,—about 5 mg.,—almost all cases of Cushing's disease (I think Dr. Albright will agree) having high ketosteroids, and all cases of cancer of the adrenal gland having tremendously high values, even up to 100 mg. We have these three things to explain if we say that this patient had Cushing's disease. How can we explain the enlarged clitoris? If we accept that finding, we have to explain it by some masculinizing type of tumor—adenoma of the androgenic cells of the adrenal gland or tumor of the ovary of the masculinizing type. On the second admission, the patient had pain in the pelvis, with tenderness after bleeding and with great tenderness on examination. Might there be an ovarian tumor of some type? Against this is the fact that she had been examined under ether and nothing had been felt; but one of the men in the Out Patient Department thought that he did feel a mass. If we consider the ovarian tumors that cause bleeding after the menopause—and with bleeding after the menopause ovarian tumors must always be considered—and if we also consider ovarian tumors that have endocrine activity, we have to consider three: granulosa-cell tumors, thecal-cell tumors and arrhenoblastomas. The first two are feminizing tumors and cause bleeding by

*Soskin, S. The blood sugar: its origin, regulation and utilization. *Physiol. Rev.* 21:140-193, 1941.

the overproduction of estrin, which in turn produces hyperplasia of the endometrium. At operation the endometrium was atrophic. The arrhenoblastoma is a virilizing tumor and would account for the large clitoris, but would not account for the weakness, because patients with this type of tumor are strong. It would not account for bleeding, because the virilizing tumor characteristically stops bleeding. Dr. Albright has seen one case of arrhenoblastoma in which periods went on but ovulation ceased. Arrhenoblastoma would not explain the changes in the sugar metabolism. We have on examination no evidence for a Cushing's tumor of the adrenal gland, nor have we any evidence for a tumor in the ovary. We cannot explain the bleeding and the large clitoris satisfactorily from any one point of view. There is one other possibility. This woman did have headaches. We are not told anything about the possibility of acromegaly. Acromegaly might explain the picture. We could have a diabetic curve due to insulin resistance. The ketosteroids would not be raised. We are not told about the visual fields; we are told only that the eyes were normal. We are not told about the phosphorus, which may be increased in acromegaly, nor are we told about the facies and teeth. I think that we must consider acromegaly as a possibility.

The only way that I can put this case together is as follows: It is possible that this woman was bleeding from an atrophic uterus, that she forced blood out of the tubes into the pelvis, causing a localized aseptic peritonitis, which might explain the pelvic situation. I do not see how we can explain the whole picture on the basis of ovarian tumor. The enlarged clitoris I shall have to put down as unexplained,—that she was a big woman and had a big clitoris, or the examiner was not conversant with the various sizes of the clitoris. I believe that this case fits best into the Cushing's disease group, and I should like to ask Dr. Albright if the ketosteroids are always high in that disease. If that is so, and if the ketosteroids were low normal here, I should be forced back to the hypothesis that the patient had an eosinophilic tumor of the pituitary gland.

DR. FULLER ALBRIGHT: I think we can give Dr. Fremont-Smith more information. I should like to say that the skin was not atrophic. What was the follicle-stimulating hormone test in the urine before operation?

DR. TRACY B. MALLORY: It was not done until two days after operation, when it was negative.

DR. FREMONT-SMITH: That would mean that the basophilic cells were not active, as they should be after the menopause. That makes one believe there was something interfering with the basophilic

cells, such as tumor of the eosinophilic cells. Is there any more information that I could have?

DR. ALBRIGHT: You have not commented on the acne.

DR. FREMONT-SMITH: I wish you would comment on that.

DR. ALBRIGHT: I think Dr. Fremont-Smith has given an excellent discussion. He did not come out with the right answer any more than those who saw the patient before the operation. To one like myself, who saw her only after the diagnosis was made, it was easy to see that the findings fitted in with the correct diagnosis. The follicle-stimulating-hormone test two days after operation was negative and presumably was negative before operation. This test should be positive after the menopause unless some factor is present that inhibits its production. One of the hormones that does just this is testosterone. The fact that this test was negative, therefore, would make one go back to the possibility of an arrhenoblastoma, which produces either testosterone or, what is more likely, a testosteronelike steroid. Furthermore, testosterone does produce acne. The patient had hot flashes at one time, which is strong evidence, in my opinion, that at that time she had an excess production of follicle-stimulating hormone. It would be my interpretation that the arrhenoblastoma developed subsequent to the time when the patient was having hot flashes. It is of interest that the follicle-stimulating-hormone test, done some time after the arrhenoblastoma was removed, was strongly positive, as was to be expected.

DR. FREMONT-SMITH: How about the sugar curve?

DR. ALBRIGHT: I cannot answer that. It is of interest that the glucose-tolerance test done some time after operation was perfectly normal. I do not know whether this indicates that the arrhenoblastoma had an effect on sugar metabolism, or whether the patient was not properly prepared for the first test. I am inclined to the latter interpretation. Incidentally, the glucose-insulin-tolerance tests did not show insulin resistance, as stated above.

DR. FREMONT-SMITH: How about the bleeding?

DR. ALBRIGHT: I think you explained it—an atrophic uterus.

DR. FREMONT-SMITH: In fairness I think I should say that I thought they operated on the uterus to get rid of the bleeding.

DR. MALLORY: The only preoperative diagnosis that they committed themselves to was postmenopausal bleeding.

DR. FREMONT-SMITH: How about the ketosteroids?

DR. ALBRIGHT: In our one other case of arrhenoblastoma in which the 17-ketosteroids were measured they were found to be normal.

DR. MALLORY: But should they not be high?

DR. ALBRIGHT: They should be if the arrhenoblastoma produces testosterone. There are several steroids similar to testosterone that are masculinizing but are not 17-ketosteroids.

DR. FREMONT-SMITH: Are the ketosteroids always high in Cushing's disease?

DR. ALBRIGHT: No. However, if you take into account that most patients with Cushing's syndrome are very debilitated, a condition that in itself leads to low 17-ketosteroid excretion, I think it is fair to say that the 17-ketosteroids are either high or relatively high.

CLINICAL DIAGNOSIS

Postmenopausal bleeding.

DR. FREMONT-SMITH'S DIAGNOSIS

Cushing's syndrome.

ANATOMICAL DIAGNOSIS

Adenoma testiculare of ovary.

PATHOLOGICAL DISCUSSION

DR. MALLORY: At operation the old abdominal scar was opened up and an exploration performed. The surgeon palpated both adrenal glands and reported that they felt larger than normal, but could find no evidence of tumor in either. I think it is reasonable to question even that first statement, because my experience is that the surgeon always thinks the adrenals are larger than normal if he palpates them. One naturally visualizes the adrenal glands as they are seen at autopsy, when they contain no blood. The adrenal gland is distinctly larger in life than it is at autopsy.

The pelvis was more carefully explored, and a sharply localized tumor was found in the right ovary, which measured 3 by 2 by 2 cm., and was yellowish in color. At that point they became convinced that they were dealing with an arrhenoblastoma. Since, however, the most distressing symptom had been the uterine bleeding, they considered it wise to do a hysterectomy and get rid of the focus of bleeding, as well as to remove the ovarian tumor. In our laboratory when the tumor was examined it turned out to be the more highly differentiated form of masculinizing tumor known as the "adenoma testiculare of Pick" rather than the so-called "arrhenoblastoma." The older literature would lead one to believe that the adenoma testiculare is not a functioning tumor, but this is the second we have

had in this hospital in which there was evidence of a masculinizing action.

CASE 27162

PRESENTATION OF CASE

First Admission. A sixty-five-year-old wool cutter entered the hospital complaining of burning and frequency of urination.

Three months before admission the patient cut his left leg. The lesion was slight and he continued working, but it did not heal, discharged a dirty purulent material, and gradually progressed to a deep ulcer. Pain, redness and swelling developed in the leg to a point necessitating hospitalization.

One week before admission, the patient awoke with a gripping sensation in the right chest, accompanied by a cough and a small amount of blood-streaked sputum. The sputum lasted for one day, but the chest pain continued for three days.

Four years before admission, the patient had been refused life insurance because of high blood pressure. Since that time he had noticed a progressive decrease in his exercise tolerance, so that at the time of admission he was unable to climb a flight of stairs without dyspnea. Of recent weeks swelling had appeared in the feet and ankles of both legs.

He complained also of occasional nocturia for an unstated period. He had had scarlet fever, and twenty-five years before admission "bronchial asthma" for six months. Usually he drank one or two glasses of beer each day and up until two years before admission anywhere from a half pint to two pints of whiskey a week. The patient's father had died of carcinoma of the stomach.

On examination the patient was well developed, well nourished and very drowsy. The tongue was dry, the pharynx injected and covered with a purulent exudate. The lungs were clear, the heart slightly enlarged to the left, but otherwise normal; the blood pressure was 118 systolic, 78 diastolic. The peripheral arteries were soft and pliable. The abdomen was protuberant, and the smooth, non-tender liver was palpable 3 fingerbreadths below the right costal margin. Slight pitting edema of the sacrum was present. The prostate was slightly enlarged, but not of abnormal consistence. The right leg was reddened from the toes to the knee, with a sharp, but irregular line of demarcation at the normal skin border. The upper portion was hemorrhagic and did not blanch on pressure. A 4.5-cm. ulcer with a dirty base and surrounded by small pustules was present over the lower tibia.

The entire lower leg was tender and indurated without fluctuation, and the left thigh was pink and edematous, especially on its medial aspect. There was pitting edema of both lower legs, and the right lower leg showed areas of hemorrhagic discoloration. Pulsation could not be felt in either dorsalis pedis or posterior tibial arteries, but was present in the popliteals and femorals.

The temperature was 100.2°F, the pulse 82 and the respirations 23.

The urine gave a green and occasionally an orange sugar reaction. The blood showed a red-cell count of 4,650,000 with a hemoglobin of 85 per cent, and a white-cell count of 15,000 with 86 per cent polymorphonuclears. The fasting blood sugar was 127 mg, the nonprotein nitrogen 27 mg and the protein 5.4 gm. per 100 cc. The prothrombin time was 24 seconds (normal 19), a hematocrit reading 44 per cent, the vitamin C 0.5 mg per 100 cc.

An x-ray film of the legs showed a marked irregularity of the soft tissue about the left lower leg, with a defect anteriorly and posteriorly. There was very slight calcification along the anterior aspect of the tibia. No periosteal new bone formation was visible.

The patient was given sulfanilamide, intravenous fluids and digitalis, the blood sugar being controlled by diet and insulin. Cultures from the ulcers yielded *Bacillus subtilis*, *Proteus vulgaris* and *Staphylococcus aureus*. Two days after admission, a slight icteric tint was noted in the scleras and the serum van den Bergh at this time was 6.5 mg. per 100 cc, biphasic; sulfanilamide therapy was discontinued and a high-vitamin, high-carbohydrate and low fat diet instituted. The patient's legs improved very favorably, and the edema subsided, but a week after admission a deep ulceration with purple margins and dirty base developed in the left calf and two days later was found to communicate with a collection of pus between the muscle planes; this was incised and drained under local anesthesia. Subsequently a carbuncle of the left buttock appeared, and excision was necessary. Under treatment the patient slowly improved, and the ulcers healed with the aid of pinch grafts. The diet was readjusted to combat the hyperglycemia, and the patient was discharged eight weeks after admission, at which time the serum van den Bergh was 2.0 mg. per 100 cc, biphasic, and a bromsulphalein test showed 10 per cent retention of the dye. The last urine specimen, recorded three weeks before discharge, was negative, and 28 previous specimens had contained no sugar.

Final Admission (seventeen days later). Shortly after leaving the hospital, the patient began to

have urinary difficulties in the form of hesitancy, frequency with large quantities voided, and a slow, weak stream. In addition, there was burning, and nocturia thrice a night. He denied hematuria, chills, fever, nausea or vomiting. For the previous week he had suffered from a nonradiating, dull, aching pain in the left flank and costovertebral angle. Two days before admission, he was unable to void and was catheterized by his physician.

On examination the patient was drowsy and in moderate distress. The heart and lungs were essentially normal, the blood pressure 130 systolic, 85 diastolic. There was exquisite tenderness, bulging and spasm in the left costovertebral angle; the liver was palpable three fingerbreadths below the costal margin. The prostate was greatly enlarged, smooth, symmetrical and firm. Peripheral edema was not present.

The temperature was 101.5°F, the pulse 72, and the respirations 20.

The urine showed a +++ test for albumin and was loaded with white blood cells and bacteria; a culture yielded abundant colonies of nonhemolytic streptococci and *Staph. albus*. The blood showed a red cell count of 3,400,000 with a hemoglobin of 60 per cent, and a white-cell count of 38,900 with 96 per cent polymorphonuclears. The fasting blood sugar was 142 mg, the nonprotein nitrogen of the serum 45 mg, the protein 5.8 gm. per 100 cc, the chlorides being 835 milliequiv and the carbon dioxide combining power 26.6 milliequiv per liter. A phenolsulfonephthalein test showed 7 per cent excretion of the dye in two hours.

An intravenous pyelogram was unsatisfactory, owing to marked respiratory motion on all films. The colon was markedly distended with air and appeared slightly dilated down to the sigmoid; the rectum was not dilated. No filling of the kidneys was visible on any of the films, and no dye was seen in the bladder at the end of forty-five minutes. An electrocardiographic recording showed a normal rhythm at 100 and a PR interval of 0.17 second. There was marked left axis deviation, S₂ was deep, ST segments were slightly depressed in Lead 1 and elevated in Lead 3 and T₁ was biphasic.

Slow decompression of the bladder was carried out, and chemotherapy and intravenous fluids, guarded by insulin, given. On the third hospital day the prostate was found to be tender and fluctuant, so that a perineal drainage of the abscess was performed; a culture of its purulent contents yielded *Staph. aureus*. Throughout hospitalization the patient was stuporous and toxic, respiration became labored, the temperature rose to 102°F and the pulse to 110. One week after admission

the nonprotein nitrogen was 90 mg. per 100 cc., the chlorides 91.7 milliequiv. and the carbon dioxide combining power 21.8 milliequiv. per liter. A flat abdominal film showed apparent thickening in the soft tissues in the region of the right psoas muscle, and the left psoas muscle was but faintly visualized. An x-ray film of the chest taken with a portable machine showed poor aeration of both lower lung fields, more marked on the left side, where there was definite evidence of consolidation consistent with pneumonia. Two days later cystoscopic examination was performed. The bladder mucosa was pale, lackluster and edematous, and the ureteral orifices were edematous. Catheters were passed to both kidneys, and this was followed by hydronephrotic drips from both. The culture from the left kidney yielded *Staph. aureus*, that from the right, a moderate growth of nonhemolytic streptococci. Finally the patient became comatose and dyspneic, edema developed to the scrotum, and the nonprotein nitrogen rose to 100 mg. per 100 cc. Death occurred two weeks after admission.

DIFFERENTIAL DIAGNOSIS

DR. CHAMP LYONS: Dr. Bland, can you give us an interpretation of these electrocardiographic hieroglyphics?

DR. EDWARD F. BLAND: Yes; it is an abnormal record, the chief thing being left-axis deviation, which suggests some cause for strain on the left ventricle. The ST changes are, however, secondary to the axis deviation.

DR. LYONS: Dr. Hampton, should you like to comment on the x-ray films now?

DR. AUBREY O. HAMPTON: I am not very proud of these films. They all show motion. The patient was apparently unable to co-operate, and all the statements made in the record are probably based on insufficient evidence.

Is there anything that interests you very much?

DR. LYONS: I am particularly interested in the interpretation of the consolidation in the lungs.

DR. HAMPTON: As you can see, it is rather difficult to tell whether there is anything there or not. There is always more density along the left border of the heart when there is motion, and we may be making the mistake of calling that shadow pneumonia. I should think there is an area of consolidation in the left lung near the border of the heart. Small lesions diffusely scattered over the lung are not ruled out.

DR. BLAND: Is the left ventricle full?

DR. HAMPTON: Yes; the heart appears enlarged, particularly in the region of the left ventricle. I was trying to find the best film here of the psoas-muscle shadows. They were apparently interested

in the psoas muscles. The upper parts of both muscles are distinct. The lower portions fade out, but I do not believe we have enough evidence to suggest a psoas abscess. The kidneys appear large, and they do not function, as indicated by intravenous pyelogram.

DR. LYONS: This is the record of a sixty-five-year-old wool cutter with a progressive infection. His occupation suggests the possibility of anthrax, but all the cultural evidence indicates a staphylococcal infection.

Of interest in the past history are the stories of alcoholism, scarlet fever and progressive symptoms of heart failure during the last four years.

The immediate history is one of a neglected traumatic wound of the leg, which failed to heal, discharged pus, became ulcerated, and developed areas of hemorrhagic discoloration. One week before entry the patient suffered what I have interpreted as a pulmonary infarct.

On entry to the hospital he was dehydrated, with mild congestive failure and mild diabetes. A culture of the leg wound revealed *Staph. aureus* as the most probable pathogen. The absence of arterial pulsations in both lower extremities was indicative of peripheral arteriosclerosis and circulatory failure. The irregular but sharply demarcated zone of redness and hemorrhagic discoloration that did not blanch on pressure is of real interest. This is not the picture of erysipelas; the cultures failed to show a hemolytic streptococcus, and the patient should not have been very sensitive to erysipelas toxin because of the history of scarlet fever. The blood Hinton reaction is not reported, but tertiary syphilis is not a satisfactory explanation of this picture. A normal blood cevitic acid and prothrombin time and an absence of purpuric spots elsewhere make it likely that the skin changes were of local origin. I have interpreted these changes as the result of a venous thrombosis in an extremity with circulatory deficiency. This offers a logical explanation of the source of the pulmonary infarct described in the history and permits a hypothetical reconstruction of the course of events that led to the patient's death. I have reasoned that the thrombophlebitis was a septic staphylococcal thrombophlebitis and gave rise to the staphylococcemia necessary for the development of metastatic visceral abscesses present at the time of the second admission.

The enlarged liver and the development of jaundice after two days of sulfanilamide are extremely interesting. If the liver enlargement were on the basis of congestive failure, I should have expected it to be tender and associated with signs of pulmonary congestion. Amyloid disease does not ap-

pear likely because of the short history of sepsis. The history of alcoholism suggests that there may have been an alcoholic type of toxic cirrhosis. Jaundice developed coincidentally with the use of sulfanilamide and digitalis, and I believe that this was a toxic hepatitis in a cirrhotic liver.

At the time of the second admission the patient presented the problem of multiple abscesses and renal failure. A staphylococcal abscess of the prostate was drained, and the clinical signs of perinephric abscess on the left were present. The x-ray picture of consolidation was probably produced by septic pulmonary infarcts, which could have come from the prostatic venous plexus but more probably from the veins of the right leg. The blood culture post mortem should be positive for staphylococci. The location of other abscesses is largely a matter of conjecture on a statistical basis. There is no evidence in the record to establish a diagnosis of endocarditis, brain abscess or vertebral osteomyelitis. One or more small myocardial abscesses are extremely likely. My final diagnoses are: staphylococemia; extensive septic thrombophlebitis arising from the veins of the right leg; septic pulmonary infarcts; abscesses of the kidneys, heart and prostate; peripheral arteriosclerosis and arteriosclerotic heart disease; toxic cirrhosis of liver—alcoholic type; mild diabetes mellitus; and healed ulcer of leg.

CLINICAL DIAGNOSES

Cellulitis of left leg.
Carbuncle of buttocks.
Prostatic abscess.
Acute pyelonephritis.
Uremia.
Cirrhosis of liver.
Arteriosclerotic heart disease.

DR LYONS'S DIAGNOSES

Staphylococemia.
Extensive septic thrombophlebitis arising from the veins of the right leg.
Septic pulmonary infarcts.
Abscesses of the kidneys, heart and prostate.
Peripheral arteriosclerosis and arteriosclerotic heart disease.
Toxic cirrhosis of liver, alcoholic type.
Mild diabetes mellitus.
Healed ulcer of leg.

ANATOMICAL DIAGNOSES

Staphylococcal septicemia with abscesses in prostate, kidneys and lungs.
Ulceration of left lower leg.
Septic thrombophlebitis, left leg.
Septic infarction of the lungs.

Hypertrophy of the heart.
Biliary cirrhosis of the liver.
Cholelithiasis.

PATHOLOGICAL DISCUSSION

DR TRACY B. MALLORY: At the time of autopsy the major sepsis was localized in the kidneys. Both kidneys were very considerably enlarged and were studded with innumerable soft and large abscesses that had almost completely destroyed the parenchyma. I think the immediate cause of death was probably renal insufficiency rather than sepsis, although unquestionably both must have played a role. There were areas of septic infarction, with definite abscess formation in the lungs. The heart was enlarged, without an intrinsic lesion. The coronary arteries for his age were in quite good condition. I should think there was very little doubt that the hypertrophy went back to his known hypertension of many years' duration.

The liver was normal in size, and showed no evidence of abscess formation or chronic alcoholism. There was none of the fatty vacuolization that usually precedes an alcoholic cirrhosis. On the other hand, there was very slight but definite cirrhosis, and this was of the biliary type. There was proliferation of bile ducts and a significant inflammatory infiltration of the periportal connective tissue. Nothing in the history suggested gallstones, but the gall bladder did contain numerous faceted stones, and I should think that at some time in the past the patient must have had one or more stones in the common duct that caused some degree of obstruction and perhaps some retrograde infection. There was a considerable degree of inflammatory infiltration of the perinephritic tissues on both sides, a little more marked on the right, without, however, any frank perinephritic abscess. We were unable to determine the source of the septic emboli to the lungs. They might have come from either the leg vein or the periprostatic plexus. The sections showed a great many clusters of organisms resembling staphylococci in both lungs and kidneys.

DR HAMPTON: I should like to ask if anyone would consider ligating that vein if this situation occurred again.

DR LYONS: I should like to point out that, when the vein originally thrombosed, hemorrhagic discoloration appeared. We have done femoral-vein ligation for thrombosis in this age group without changing the course of events. The last patient died of gas bacillus infection with necrosis.

DR BENJAMIN CASTLEMAN: Your objection to ligation would apply only to septic phlebitis?

DR LYONS: Yes.

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of
THE MASSACHUSETTS MEDICAL SOCIETY
and
THE NEW HAMPSHIRE MEDICAL SOCIETY

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SUBSCRIPTION TERMS: \$6.00 per year in advance, postage paid, for the United States; Canada, \$7.04 per year, Boston funds; \$8.52 per year for all foreign countries belonging to the Postal Union.

MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

IN MEMORIAM: FREDERICK GRANT BANTING—EDWIN NELSON CLEAVES

FREDERICK GRANT BANTING, born on November 4, 1891, at Alliston, Ontario, was graduated in medicine from the University of Toronto in 1917 and soon was awarded the Military Cross for attending the wounded under fire at Cambrai, France. The world knows of his collaboration with a medical student, Charles H. Best, in the laboratory of Professor McLeod at the University of Toronto, of their joint discovery of insulin, announced in 1922, and of Banting's insistence that his half of the Nobel Prize, awarded in 1923, be shared with his co-worker, Best.

Known only to a small group is the Boston story, that of Edwin Nelson Cleaves, born in Med-

ford, Massachusetts, in 1890, and graduated from Harvard College in 1911 and from the Harvard Medical School in 1915; following graduation he was a surgical house-officer at the Massachusetts General Hospital.

It was while a house-officer, in 1916, that Cleaves, short of stature but of good physique, former captain of the Harvard Gymnastic Team, one hundred and forty pounds at his best weight, first discovered that he was excreting sugar. Becoming sugar-free on a comparatively liberal diet, he was resident and superintendent of the Out Patient Department of his hospital until the fall of 1918, when the great epidemic of influenza overwhelmed him. From that time on, his tolerance shattered, he existed on less than a thousand calories a day, weighing ninety-three pounds in his clothes when he went west in June, 1919.

In 1922 he was back in Boston, presumably for the last time, weighing eighty-three pounds, so weak that he had to be carried from his Pullman berth to the waiting stretcher. His books were audited and his accounts closed. He had fought a good fight and lost, although for months he had refused to acknowledge defeat.

At this point the lives of Banting and Best and of Cleaves met, and from then on his life was inseparable from their lives and accomplishments, for he received insulin and was among the first to be plucked by it from the grave's very brink. With health and vigor restored he returned to the fight and entered the field of roentgenology, became a member of various societies and made his own contributions to the science and the art of healing; he found relaxation and further service in work among the boys of Trinity Church. He, also, has appropriately been called a "hidden servant"; hidden only because of the narrow circle of his professional acquaintance.

Banting, continuing his scientific career, was knighted by King George V in 1934, re-entered the army, helped to establish Canadian blood banks and made important contributions to aviation medicine. Flying on a secret war mission to Britain he fell with his plane and companions, and died

in the snows of Newfoundland on February 21, 1941.

Three days later, Cleaves went to join his particular savior, working almost to the last, the victim of a nondiabetic disease, and the victor over diabetes for more than twenty-five years.

EARLY DIAGNOSIS OF TUBERCULOSIS

THE nation-wide Early Diagnosis Campaign being held throughout April by the National Tuberculosis Association and its affiliated state and local associations deserves the serious attention of every person who appreciates the need of conserving life, time, energy and money in these fateful days. Early diagnosis means a saving in lives and money. Since most cases of tuberculosis are taken care of in tax-supported institutions, and since it may take years to restore a patient with advanced tuberculosis to health,—if, indeed, cure is possible,—hospitalization of advanced cases results in a tremendous burden on the community; whereas, the early case usually is easily cured in a short time at a small cost. Year after year the public must be stirred up and made aware of the continuing threat of tuberculosis, which has lost none of its power to destroy or handicap the patient, although many fewer persons are threatened each year.

Since it is difficult to sustain interest and support in day-after-day efforts to educate the masses of people, it is well to concentrate effort and interest in a particular month. When people hear tuberculosis discussed on the radio, read articles about it in national magazines and local newspapers, and learn important facts about it from exhibits in store windows, they begin to realize that this disease is still a very serious menace. Complacency is displaced by interest and understanding and a better attitude toward the problem.

In addition to the literature provided by tuberculosis associations this year for various groups of the general public, including community leaders, educators, young, middle-aged and old people, and factory workers, a new publication is available to physicians. This brochure, entitled *Chest X-Ray Interpretation*, was written by Dr. J. Burns

Amberson, Jr., and has been published by the National Tuberculosis Association.

The theme for this year's campaign is, "A Good X-Ray is Your Doctor's Best Aid in Discovering Early Tuberculosis." This slogan should lead both those who suspect they have tuberculosis, and those who have no symptoms but want a thorough health check-up, to go to their physicians with the expectation that chest x-ray films will be taken.

The present development of technics and equipment for mass x-ray studies with less expensive film hastens the time when apparently healthy persons will be examined in large numbers. Until such time, education must be relied on to convince people who most need x-ray study that they should use existing services.

OBITUARY

GEORGE LINCOLN WALTON

1854 - 1941

In the death of George Lincoln Walton on January 17, the Boston Society of Psychiatry and Neurology lost its oldest living member. Dr. Walton's name is doubtless only a memory to most of those present, for he ceased practice in 1916; even to the writers his early activities are shrouded in tradition, and acquaintance was based more on the happy philosophy that radiated from him in social contact, than on factual discussion in the clinic.

Dr. Walton's early interests in neurology were varied. At the turn of the century, the neurologist was equally interested in the functional and the organic diseases of the nervous system. His papers, of which there are three large volumes at the Harvard Medical School, show an interest in both, but emphasize especially structural diseases and their diagnostic signs. Even in 1900 a paper written in collaboration with Dr. W. E. Paul, commending, on the basis of much clinical study, the value of the Babinski reflex, was a novelty. His successful attempts at localization of tumors of the brain and spinal cord are duly registered, and his usefulness to the surgeon is apparent. A letter from the elder John Homans in reminiscent vein denotes the significant relation of neurologist and surgeon of that time: "I remember your dancing round the operating room—I swear it—and saying that you had waited twenty-five years for this moment, that you had made diagnoses and that no surgeon could take the tumor out."

Perhaps his main contribution to structural neurology concerns dislocation of the cervical vertebrae and the manipulation that he devised for reduction; this was in the days of observation and palpation, with no help from x-ray films.

Many of Dr. Walton's early papers deal with hysteria. Doubtless his name is most closely linked with three small popular books on psychotherapy. Many a person received help from these simple, often whimsical, yet erudite treatises on the various aspects of psychoneurosis, and one at least — *Why Worry* — ran to twenty-three printings. Those were the days of exhortation, of reasoning and of reassurance. Psychoanalysis had not been heard of, and when it came was not approved by Dr. Walton.

But it is as a happy man of resource that we like to think of him: always eager, always courteous and helpful both in word and deed. His retirement from active practice in 1916 at the age of sixty-two gave him, unlike most men, the time he had looked forward to for the hobbies that he had always advocated for others. During the subsequent twenty-five years these avocations embraced many intellectual fields, in two of which Dr. Walton became more than an amateur. He collected old silver, some pieces of which are now in the Museum of Fine Arts; he became an excellent photographer; he studied certain aspects of archaeology and gave to the Warren Museum an exhibition illustrating burial customs of ancient Egypt. History, especially historical facts, intrigued him, and his writings give evidence of this interest. A botanical work *The Flower Finder*, first published in 1914, went through four editions to 1935, and is still an approved guidebook, based on his own classification — that of color rather than of family.

With all his scientific and cultural interests, his wit, as shown in his conversation and in his writing, runs throughout, and his occasional poems, read before gatherings of the American Neurological Association and of the Chakara Club and elsewhere, disclose the gay yet serious qualities of his mind.

Dr. Walton's death breaks a link with our intellectual past. We mourn this fact. We acclaim his success.

C. A. M.
J. B. A.

MEDICAL EPONYM

HENLE'S LOOP

This anatomic structure was described by Friedrich Gustav Jacob Henle (1809–1885), professor of anatomy at Göttingen in his *Handbuch der sys-*

tematischen Anatomie des Menschen (Vol. II, p. 303; Braunschweig, 1862). A portion of the translation follows:

The narrow canaliculae are always found in the interstices between the larger ones, running parallel with them and showing no tendency whatever to join them. Instead, they terminate at various levels, the lowest immediately under the surface of the papillae in the bridges between the larger canals, and are blind in the sense that two neighboring canaliculae join together in a sharp loop. Because of this course I have given them the name of loop-shaped canaliculae.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

COMMITTEE ON STATE AND NATIONAL LEGISLATION

House Bill 1477, the enabling act for medical-costs insurance sponsored by the Society, has been passed by the Committee on Insurance, and the House Counsel has written an emergency preamble to the bill. It has received a new number, becoming House Bill 2301, and has been sent to the House Committee on Ways and Means. No date has yet been set by that committee for a hearing on the bill, but all members of the Society should get in touch with members of that committee who are from their districts and ask them to act favorably and promptly on the bill. The list of members of the House Committee on Ways and Means, with their addresses, appeared in the March 20 issue of the *Journal*. All representatives and senators not on the committee should be requested to appear before the committee and register their approval of the bill.

HENRY C. MARBLE, *Chairman*.

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

HYPERTENSION ASSOCIATED WITH PREGNANCY AND RESULTING IN PREMATURE DELIVERY AND FATAL POST-PARTUM CONVULSIONS

A twenty-nine-year-old para IV was first seen very early in her pregnancy by her family physician. At that time her blood pressure was 180 systolic, 110 diastolic, and her weight was over 200 pounds.

At fourteen years of age, the patient had had a

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

blood pressure of 190 systolic. There was no history of scarlet fever or of kidney disease. The first pregnancy resulted in a normal delivery of a living child, the second and third pregnancies were terminated by miscarriage.

Physical examination at the time of her first visit was negative except for the aforementioned blood pressure and obesity. The lungs were clear and resonant; there were no rales. A therapeutic abortion was advised and refused.

The patient was seen routinely and was put to bed when five months pregnant. During this time her blood pressure ranged between 200 and 80 systolic, 120 and 110 diastolic. She started in spontaneous labor when she was just over eight months pregnant and delivered normally a living child. One hour later the first of five convulsions occurred, and three and a half hours after delivery the patient died. The baby died a week later of prematurity.

Comment. This is a case of hypertension, probably nephritic in origin and of at least fifteen years' duration, which resulted in premature birth and post-partum convulsions. Whether these convulsions could be called eclampsia or whether they were uremic convulsions due to an underlying chronic nephritis is debatable. The usual case of eclampsia develops in women who have normal blood pressure at the beginning of pregnancy.

Hypertension of this degree—200 systolic, 120 diastolic—at the onset is a grave condition, and conservatism indicates the interruption of pregnancy. In this particular case, the suggestion of interruption was made, but the patient refused. She was treated adequately with rest in bed after the fifth month; frequent urinalyses were carefully carried out, and a proper diet was prescribed, but the outcome was only what one might have expected.

Premature labor is a common occurrence in cases of hypertension. Intrauterine death frequently precedes premature labor, and when this occurs the patient often improves symptomatically. Obstetrically, it might have been wise to have delivered this woman as soon as it was believed that the baby was viable. The possibility of her going to term and surviving with a blood pressure of this sort from the beginning was extremely unlikely.

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning April 20:

BERKSHIRE

Thursday, April 24, at 4:30 p.m., in the Bishop Memorial Building, Pittsfield. *Obstetric Infections: Diagnosis and treatment.* Instructor: Joseph W. O'Connor. Harry G. Mellen, *Chairman.*

BRISTOL SOUTH (Fall River Section)

Tuesday, April 22, at 4:30 p.m., at the Union Hospital, Fall River. *Diagnosis and Treatment of Minor Lesions of Rectum and Anus.* Instructor: Franklin G. Balch, Jr. Howard P. Sawyer, *Chairman.*

FRANKLIN

Thursday, April 24, at 8:00 p.m., in the Library of the Franklin County Public Hospital, Greenfield. *Acute Abdominal Pain: Its interpretation and management.* Instructor: Stanley J. G. Nowak. Halbert G. Stetson, *Chairman.*

HAMPDEN

Wednesday, April 23, at 4:00 p.m., at the Academy of Medicine, Professional Building, 20 Maple Street, Springfield, and at 8:00 p.m., in the Outpatient Department of the Skinner Clinic, Holyoke Hospital, Holyoke. *Pediatric Case Discussions.* Instructor: Edwin H. Place. Alfonso A. Palermo, *Chairman.*

HAMPSHIRE

Thursday, April 24, at 4:15 p.m., in the Nurses' Home of the Cooley Dickinson Hospital, Northampton. *Therapeutic Uses of Preparations of Endocrine Glands: Thyroid gland, pituitary gland, ovary, testis and adrenal cortex.* Instructor: Harry B. Friedgood. Robert C. Byrne, *Chairman.*

WORCESTER

Tuesday, April 22, at 8:30 p.m., in the Nurses' Home of the Milford Hospital, Milford. *Chemotherapy in the Treatment of Gonococcal Infection.* Instructor: Weston T. Buddington. Joseph Ashkins, *Chairman.*

WORCESTER NORTH

Friday, April 25, at 4:30 p.m., in the Nurses' Home of the Burbank Hospital, Fitchburg. *Dermatitis and Eczema.* Instructor: Mildred L. Ryan. George P. Keaveny, *Chairman.*

THE EGO: NERVES AND SELFISHNESS*

Mental hygiene, maladjustment, "nerves" and nervous breakdowns are so much talked about and written about these days that we may well be somewhat bewildered in trying to understand and to know what to believe. Most of us have become more and more conscious of the fact that we can feel nervous, unhappy or even sick without any physical disease. We are told that our emotions or mental conflicts can cause nervousness in its many forms. And furthermore we are advised that we may not even be aware of what is making us nervous, because the seat of our troubles may be in our unconscious minds. Unconscious or subconscious desires or conflicts are pointed to

*A "Green Lights to Health" broadcast given through station WAAB by Dr. Vernon F. Williams on Wednesday, January 29, and sponsored by the Public Education Committee of the Massachusetts Medical Society and the Massachusetts Department of Public Health.

as the origin of our jitters, our gloomy moods, our restlessness, unhappiness and so forth.

Now, this so-called "discovery" of modern science—that unconscious motives may be responsible for the way we act and the way we think and feel—can be quite disturbing if not frightening. We may be at a loss to know what awful forces or ideas have us in their power, and even if we try to find out we may not be sure that we have the right answer.

In maintaining or regaining a reasonable degree of mental health, it may not always be necessary to ask for the aid of a specialist in psychology. Even though it is true, as it certainly is, that we can get into trouble because of motives and tendencies of which we may be unaware, we should not let ourselves off too easily with the partially comforting thought that we are not responsible because we are in the grip of our mysterious unconscious minds. If we are willing to face the facts,—and it is healthy to do so,—we can frequently see wherein our difficulties lie.

Today the subject to be discussed is related to one very important part of the structure of the human personality—a part that is so obviously present in all of us that it should not require the expert help of a psychiatrist to make us aware of its existence. It is powerful and forceful, and we may not always be aware of its presence and yet even a moderate amount of self-examination by a person of average intelligence will convince us that the depths of human personality do not have to be plumbed to discover it. This part of us may be called "the ego."

You know that in all of us there are deep, instinctive drives or forces that have to do with our well being. We have bones to support the other tissues of our bodies. We have hearts to pump the oxygen-carrying blood through our bodies, and we have instinctive forces, which in complicated ways enable us to adjust ourselves to and hold our own in an external world that makes all sorts of demands on us. Now what is called the ego is the urge to protect ourselves and to make our way through life with as little harm or injury to ourselves as possible. It is the same force that makes the housefly try to avoid the swatter or the bird in the street avoid the oncoming automobile. But it is more than that: it is also the force that inclines us to get as much as we can for ourselves. It gives us our ambition, our desire to excel or at least to be as good as anybody else in the many situations that develop from our contacts with other human beings. It is the force that tends to make us see ourselves in as favorable a light as possible and to close our eyes to our shortcomings. And sometimes, unfortunately, it is the force from which comes an insatiable craving for power. I refer not only to a would-be world conqueror, but also to anyone who does not have the sense to limit his desires for dominance or pre-eminence in all the various directions in which his interests may lie.

Now, this ego drive or force is surely behind much of our behavior, and is consequently related to some of our deepest feelings and motives. One may say, "What of it? Isn't it good and natural to want to protect and develop oneself?" Of course it is, but the trouble is that unless this ego drive is controlled by reason and intelligence, it may get out of hand and lead us into difficulties. And one of the common difficulties is nervousness in some form or other.

If we have become accustomed to obtaining what we want and then at a certain point find that our aggrandizing desires are blocked because of circumstances or because they come into conflict with what other people want, we are apt to feel frustrated and unhappy unless we have the judgment to know that it is good that there should be a

limit to our egotistic advances. And it is a fact that nervous symptoms may arise when we feel frustrated.

It is easy for us to see the importance of checking this ego drive when we are considering other people. We all know that it is common sense to curb a selfish child before he develops tantrums when he cannot have what he wants. It may not be quite so easy to see selfishness in ourselves when we are upset because our wives or husbands are not so considerate of us as we think they should be. When we are offended, it is wise to consider whether or not we too may sometimes say or do things that may be displeasing. Also we might keep in mind the possibility that we may be unhealthily sensitive or that the person who makes unpleasant remarks may himself be suffering from a maladjustment that will not be cured by counterattack.

We are inclined to be so self-protective that unless we are wise or big-hearted or generous in our feelings toward other people we react instinctively to being rubbed the wrong way. If we are offended, insulted or neglected by anyone whose attitude affects us, the tendency is to hit back, to become resentful, to bear a grudge or to brood gloomily over the offence. This is no recent discovery. Christ pointed it out when he made the suggestion about turning the other cheek. Even that fictitious creature, the cold-blooded scientist, is not immune to this self-protective reaction. It is natural to respond to and to feel friendly toward people who respond to us, or who at least do not step on our particular mental corns.

We may or may not be aware of it, but one of our first reactions in meeting people is to sense whether or not they like us or give us due consideration. Many a friendship of years' standing, founded perhaps on not too solid a basis, may be threatened or broken by a too-frank criticism of our weaknesses. Someone has said that one sign of being a mature person is having the tact not to tell our friends things about themselves that we know they do not want to hear.

Such is the nature of the ego that the memory of a slight or a hurt may continue for years. On certain occasions,—when the warmth of friendliness or sometimes the warmth of alcohol, may induce it,—one person may tell another that the only thing he has ever held against him was the time when he said thus and so—always a body blow to his self-esteem.

We do not like to think of our frailties, and we are not likely to welcome other people bringing them up for discussion. It is, of course, not healthy to be morbidly introspective, to brood over one's shortcomings, and it is not suggested that we follow such a pursuit. But it is well to consider whether or not our egos, our selfish aims, may not need investigating when we find that we are in trouble with ourselves, other people or our environments. The selfish person is not inclined to spend much time thinking of his selfishness; if he were, he might try to do something to correct it. However, one need not be predominantly selfish to have ego trouble in some direction. A man may be quite unselfish toward his wife and children and yet be jealous of someone with whom he thinks he is in competition in his office. Or he may be entirely too possessive with his wife or children and nevertheless have a very fair and co-operative spirit with his business associates. It is interesting to note that the seventeenth century French writer, the Duke de la Rochefoucauld, whom Byron called "Nature's sternest painter, yet the best," saw so piercingly into the human ego that his writings were at various times suppressed.

The self-protective ego manifests itself in many ways.

Sometimes we see it in the form of gossip or criticism of other people. The criticism is frequently of people whom we know in our hearts to be superior to us in certain respects, or of people who have done us a hurt. The criticism is a cheap leveling process by which we try to compensate for our feelings of inferiority.

Now perhaps all this sounds too simple, too obvious. After all, everyone knows that those who live in glass houses should not throw stones—this was said, of course, before the invention of the substantial, modern glass house. Everyone knows that we are more likely to see the mote in our brother's eye than to be aware of the beam in our own. But let us not be too sure that the things that are obvious can be dismissed as lacking in profundity. In modern scientific investigation of the human mind there is too often a tendency to discard the obvious as being superficial. And yet up to the present, science has discovered nothing more fundamental than the human ego.

Even the sex impulse has not been proved to be so important. It is claimed by some investigators of human behavior that some maladjustment of the sexual instinct is always the primary cause of neurotic difficulties. This can scarcely be so when we know that two people may like each other tremendously, although not at all attracted sexually. Also, it is a fact that many husbands and wives who are not particularly compatible sexually have happy and on the whole satisfactory married lives. If two people care enough about each other and about something beyond their own physical satisfaction, they can have a good and contented life together in spite of lack of sexual compatibility.*

It is true that sexual frustration, together with frustration of the desire for just the right amount and kind of affection and understanding, can be very hard to face calmly and cheerfully, and yet if we do not have it in our heads, through overemphasis, that we must have this satisfaction, we can go along very well, it has been done again and again.

It should not be concluded from this discussion of the ego that a meek, self-effacing attitude is healthy or desirable. Some people give in too easily. They do not as yet take themselves enough, and there are always others who seek advantage of those whom they can dominate. But analysis of people's difficulties shows repeatedly that a person can become nervous and unhappy because of a thwarting or frustration of his wants and desires. If we stop to think that we cannot have everything we want and cannot expect other people to be entirely as we should like to have them, the insight gained will help to dispel the emotional upheaval that is making us sick.

There need not be anything especially mysterious or unfathomable in many of our troubles if we are willing to do a little self-examination. If we are having ego trouble in relations with other people, the secret is to go a few steps farther than the other person in self-criticism, tolerance and understanding, rather than become aggressive or resentful.

Q If we are as self-protective as you suggest, I should think it would be very difficult for us to admit that our troubles are due to egotism.

A It may well be. People differ greatly in how willing they are to be frank with themselves, and again, so powerful and blind may the ego be that it seems practically impossible for some to admit that they may be wrong. But the ego drive does not have to be self-destructive. Since its very nature is to protect the personality through

intelligence and reason, this protection can be farsighted and wise. Willfulness of the moment can be sacrificed for healthy gain in the long run.

Q Would it be called selfish to strive to do one's best in one's work or profession and not to give in to obstacles?

A Not necessarily, but it is wise to remember that we all have limitations, and if nervous symptoms develop along with our striving we should consider whether or not egotistic ambition is impelling us beyond our abilities.

Q In relations between people, I should think it would be hard to know when it is right to assert oneself so that one is not being stepped on, and when one should tolerate by hold one's tongue.

A That should depend on whether one is hitting back because some weakness in oneself, which one does not like to face, has been touched, or whether the offending statement is objectively untrue. Most frequently the soft answer is good policy. Notice that policemen frequently quiet down when their outbursts do not get an angry response. We should be able to have an inner strength and self-possession founded on adequate self-knowledge. Hitting back with words or acts is then much less likely to occur, and that would in no way be a sign of moral or character weakness.

MISCELLANY

RÉSUMÉ OF COMMUNICABLE DISEASES IN MASSACHUSETTS FOR FEBRUARY, 1941

DISEASES	FEBRUARY 1941	FEBRUARY 1940	FIVE YEAR AVERAGE*
Anterior polio myelitis	0	2	0
Chicken pox	1103	1 02	1463
Diphtheria	6	13	16
Dog bite	537	630	566
Dysentery bacillary	12	41	15
German measles	89	60	141
Gonorrhea	287	291	369
Lobar pneumonia	463	5 9	695
Measles	1896	1191	2360
Meningococcus men ng 178	8	5	12
Mumps	696	668	1043
Paratyphoid B fever	4	1	1
Scarlet fever	531	509	941
Syphilis	344	405	429
Tuberculosis pulmonary	192	1 9	184
Tuberculosis other forms	13	30	22
Typhoid fever	3	5	5
Undulant fever	5	4	3
Whooping cough	931	532	828

*Based on figures for preceding five years

RARE DISEASES

Anthrax was reported from Malden, 1 (delayed report), total, 1.

Diphtheria was reported from Chelsea, 2, Natick, 1, Peabody, 1, Rehoboth, 1, Waltham, 1, total, 6.

Dysentery, bacillary, was reported from Belmont, 4, Danvers, 3, Cambridge, 1, Holliston, 4, total, 12.

Infectious encephalitis was reported from Attleboro, 1, total, 1.

Malária (therapeutic) was reported from Foxboro, 5, total, 5.

Meningococcus meningitis was reported from Brn stable, 1, Boston, 1, Fairhaven, 1, Groton, 1, Hopedale, 1, New Bedford, 1, Northbridge, 1, Waltham, 1, total, 8.

Paratyphoid B fever was reported from Chelmsford, 1, Norwood, 1, Salem, 2, total, 4.

Pellagra was reported from Boston, 2, total, 2.

Septic sore throat was reported from Bernardston, 3,

*This and the subsequent paragraph were omitted in the broadcast.

Boston, 9; Chelsea, 1; Fall River, 2; Holyoke, 1; Lynn, 1; Medford, 1; Merrimac, 1; Newton, 1; Norfolk, 1; Peabody, 1; Revere, 2; Winchester, 1; Wrentham, 1; total, 26.

Tetanus was reported from: Concord, 1; total, 1.

Trachoma was reported from: Boston, 2; Cambridge, 1; Springfield, 1; total, 4.

Trichinosis was reported from: Boston, 1; Framingham, 4; Southbridge, 1; total, 6.

Typhoid fever was reported from: Boston, 1; Cambridge, 1; Medford, 1; total, 3.

Undulant fever was reported from: Brockton, 1; Montague, 1; Palmer, 1; Reading, 1; Wayland, 1; total, 5.

Undulant fever, paratyphoid B fever, tuberculosis (pulmonary) and whooping cough were reported above the five-year averages.

Chicken pox was reported at the lowest figure since the corresponding month in 1932.

Diphtheria hit a record low figure for February.

Dog bite was reported at the lowest figure for this month since 1938.

German measles, gonorrhea, measles, meningococcus meningitis, mumps, scarlet fever, tuberculosis (other forms) and typhoid fever were reported below the five-year averages.

Lobar pneumonia showed a record low figure for the month.

NOTICES

BOSTON CITY HOSPITAL ALUMNI DAY

Boston City Hospital Alumni Day will be celebrated on Saturday, April 26.

PROGRAM

10:30 a.m.—12:30 p.m. Dry clinic, Cheever Amphitheater.

Carcinoma of the Large Bowel and Rectum. Dr. Frank H. Lahey.

Some Bizarre Forms Taken by Contagious Diseases. Dr. Edwin H. Place.

Progress in Gynecology and Obstetrics. Dr. Frederick L. Good.

Enlargement of the Spleen. Dr. William B. Castle.

Nature and Treatment of Pulmonary Edema. Dr. Soma Weiss.

12:45 Luncheon at the hospital.

7:00 p.m. Dinner at the University Club.

Professor Bruce Hopper, of Harvard University, will be the guest speaker.

In the afternoon, there will be a choice of seeing the Red Sox game at Fenway Park or playing golf at the Belmont Country Club.

BOSTON HEALTH LEAGUE

The annual meeting of the Boston Health League will be held at Perkins Hall, Women's Educational and Industrial Union, 264 Boylston Street, Boston, on Wednesday, April 23, at 12:30 p.m. Dr. G. Lynde Gately will speak on "Activities of the Health Department of the City of Boston."

The charge for luncheon will be 75 cents. Reservations, sent to the Boston Health League, Inc., 80 Federal Street, Boston, should be made by Monday, April 21.

MASSACHUSETTS GENERAL HOSPITAL

A meeting of the Hospital Research Council will be held in the Ether Dome of the Massachusetts General Hospital, on Tuesday, April 29, at 5 p.m.

PROGRAM

Observations on the Blocking Antibody in the Treatment of Hay Fever. Dr. Francis M. Rackemann and Miss Margaret Scully.

The Production of Hypothyroidism in Rabbits by the Injection of Thyroglobulin: Its relation to refractoriness. Dr. Jacob Lerman.

Roentgen Diagnosis of Primary Carcinoma of the Liver. Dr. Richard Schatzki.

MASSACHUSETTS SOCIETY FOR SOCIAL HYGIENE

The annual meeting of the Massachusetts Society for Social Hygiene will be held on Friday, April 25, at 4 p.m. in the Hotel Sheraton, 91 Bay State Road, Boston. The keynote of the program will be social hygiene and national defense. Brief reports will be given by Dr. George Gilbert Smith, president, and Mr. Richard H. Anthony, field representative in charge of the defense program of the society.

PROGRAM

The Soldier on Leave in Boston. Hon. Joseph Timilty, police commissioner of Boston.

Citizen Responsibility in National Defense from the Viewpoint of the Navy. Capt. Charles S. Stephenson, Bureau of Medicine and Surgery, Navy Department, Washington, D. C.

Following the program, tea will be served. The public is cordially invited to attend.

WALTHAM MEDICAL MEETING

There will be a clinicopathological staff conference of the Metropolitan State Hospital on Wednesday, April 30, at 8 p.m. A case of hemiplegia and aphasia will be presented by Drs. E. V. Semrad and R. C. Wadsworth. It will be discussed by Dr. Kurt Goldstein.

All interested physicians are cordially invited to attend.

ESSEX NORTH DISTRICT MEDICAL SOCIETY

The Essex North District Medical Society will celebrate its one hundredth anniversary on Wednesday, May 7, in Lawrence, Massachusetts. The centennial committee has prepared an interesting program for the day.

The annual business meeting of the district society will be followed by an inspection of hospitals of the city and a visit to the various textile plants. There will be a display of old photographs, instruments and manuscripts of historical significance in regard to the past one hundred years of the district society. The annual dinner will be held in the evening, at which time Dr. Walter G. Philip, president of the Massachusetts Medical Society, and Dr. Frank H. Lahey, president-elect of the American Medical Association, will be the guest speakers. A group of fellows of the society, under the direction of Dr. Benjamin Spector, will present three dramatizations of important medical events that have occurred in the past one hundred years.

The ladies of the district have prepared an interesting afternoon for the wives of the members.

Essex North District Medical Society cordially invites members of the Massachusetts Medical Society to be present at this meeting. Reservations may be secured by writing to the secretary of the district, Dr. H. R. Kurth, 477 Essex Street, Lawrence.

WORCESTER NORTH DISTRICT MEDICAL SOCIETY

The eighty-second annual meeting of the Worcester North District Medical Society will be held at the Burbank Hospital, Fitchburg, on Wednesday, April 23.

PROGRAM

- 10.00 a.m. Gonadogen (medical film).
 11.00 a.m. Treatment of General Peritonitis. Dr. Thomas J. Anglem, of the Massachusetts Memorial Hospitals.
 11.30 a.m. Carcinoma of the Lung. Dr. John W. Strieder, of the Massachusetts Memorial Hospitals.
 12.00 m. Recent Advances in Medical Therapy. Dr. Clifford L. Derick, of the Peter Bent Brigham Hospital.
 12.30 p.m. Vitamin B Deficiency (medical film).
 1.00 p.m. Recent Advances in Infant Feeding and Therapy. Dr. Edwin T. Wyman, of the Children's Hospital, Boston.
 1.30 p.m. Indications for Cesarean Section. Dr. Joseph W. O'Connor, of the Worcester Memorial Hospital.
 2.00 p.m. Dinner in the Nurses' Dining Room, Burbank Hospital.

UNITED STATES CIVIL SERVICE EXAMINATION

Psychiatric and Social Case Workers, \$2000 a Year

There are now opportunities for social workers to enter governmental service as psychiatric or social case workers. Vacancies exist in the Veterans' Administration and in the Bureau of Prisons of the Department of Justice. An examination to fill these positions has been announced by the United States Civil Service Commission. The salary is \$2000 a year.

Persons appointed in the Veterans' Administration will do psychiatric social work. In the hospitals and the regional offices of the Administration they will study patients' social needs to facilitate the medical diagnosis and treatment of the patients. Persons appointed in the Bureau of Prisons will act as social case workers in federal penal and correctional institutions. They will interview inmates and secure social data concerning them, and will co-operate with social agencies and federal probation officers on family needs and other factors affecting the inmates' adjustment. They will also follow through their duties by drafting plans for the inmates' release and subsequent readjustment.

A written test will not be given, but applicants must submit reports and writings as corroborative evidence of their training. They must have completed a four-year college course that included or was supplemented by one year of graduate or undergraduate study with a minimum of three hundred hours of supervised field work in an accredited school of social work. In addition, for positions in the Veterans' Administration, six semester hours' credit in psychiatric social work is required; and for positions in the Bureau of Prisons, six semester hours' credit in the methods of dealing with delinquent behavior.

Applications must be filed with the Commission's Washington office not later than May 14, 1941. Further

information and application forms may be obtained at any first-class or second-class post office or from the Civil Service Commission.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, APRIL 20

MONDAY, APRIL 21

American College of Physicians Hotel Statler, Boston
 12 15-1 15 p.m. Clinicopathological conference Peter Bent Brigham Hospital amphitheater.

TUESDAY, APRIL 22

American College of Physicians Hotel Statler, Boston
 12 15-1 15 p.m. Clinicomorphogenologic conference Peter Bent Brigham Hospital amphitheater

WEDNESDAY, APRIL 23

American College of Physicians Hotel Statler, Boston
 *12 m Clinicopathological conference Children's Hospital.
 12 30 p.m. Activities of the Health Department of the City of Boston, Dr. G. Lynde Gately Boston Health League Perkins Hall, Women's Educational and Industrial Union 264 Boylston Street, Boston.

THURSDAY, APRIL 24

American College of Physicians Hotel Statler, Boston

FRIDAY, APRIL 25

American College of Physicians Hotel Statler, Boston
 14 p.m. Massachusetts Society for Social Hygiene Hotel Sheraton, 91 Day State Road, Boston
 8 15 p.m. Massachusetts Memorial Hospitals, staff meeting Evans Memorial auditorium

SATURDAY, APRIL 26

Boston City Hospital Alumni Day

*Open to the medical profession
 †Open to the public

APRIL 20 — Free public lecture, Quincy City Hospital Page 436, issue of March 6

APRIL 25 — Salem Tumor Clinic Page 579, issue of March 27.

APRIL 28-30 — American Academy of Physical Medicine Scientific session Page 579, issue of March 27

APRIL 29 — Massachusetts General Hospital Page 708

APRIL 30 — Boston Society of Biologists Page 579, issue of March 27

APRIL 30 — New England Pediatric Society Page 671, issue of April 10

APRIL 30 — Waltham Medical Meeting Page 708

MAY 5-9 — American Association of Industrial Physicians and Surgeons and American Industrial Hygiene Association Page 484, issue of March 13.

MAY 8 — Perinatal Association of Physicians Page 263, issue of August 15.

MAY 11 — Boston Doctors' Symphony Orchestra Second annual concert. Page 671, issue of April 10

MAY 12-14 — American Association for the Study of Gonorrhea Hotel Statler, Boston.

MAY 13-16 — National Gastroenterological Association Hotel Commodore, New York City

MAY 21, 22 — Massachusetts Medical Society, Boston

MAY 25-JUNE 2 — American Board of Obstetrics and Gynecology. Page 262, issue of February 6

MAY 29-31 — Medical Library Association Page 671, issue of April 10

MAY 30, 31 — American Heart Association Hotel Statler, Cleveland

MAY 30-JUNE 2 — American College of Chest Physicians Hotel Statler, Cleveland

JUNE 2-6 — American Medical Association Cleveland

OCTOBER 14-17 — American Public Health Association. Page 579, issue of March 27.

DISTRICT MEDICAL SOCIETIES

ESSEX NORTH

MAY 7 — Page 708

ESSEX SOUTH

MAY 14 — Relation of the Doctor to the Law. Mr. Leland Powers New Ocean House, Swampscott

FRANKLIN

MAY 13 — This meeting will be held at 11 a.m. at the Franklin County Hospital, Greenfield

NORFOLK

MAY 8—Censors' meeting. Hotel Puritan, Boston.

SUFFOLK

APRIL 30—Page 604, issue of October 10.

MAY 1—Censors' meeting. Page 261, issue of February 6.

WORCESTER NORTH

APRIL 23—Eighty-second annual meeting. Page 709.

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

Macleod's Physiology in Modern Medicine. Edited by Philip Bard, Ph.D., professor of physiology, Johns Hopkins University School of Medicine. With collaboration of Henry C. Bazett, M.D., L.R.C.P., professor of physiology, University of Pennsylvania; George R. Cowgill, Ph.D., associate professor of physiological chemistry, Yale University School of Medicine; Howard J. Curtis, Ph.D., instructor in physiology, Johns Hopkins University School of Medicine; Harry Eagle, M.D., lecturer in medicine, Johns Hopkins University School of Medicine; Chalmers L. Gemmill, M.D., associate in physiology, Johns Hopkins University School of Medicine; Magnus I. Gregersen, Ph.D., professor of physiology, College of Physicians and Surgeons, Columbia University; Roy G. Hoskins, Ph.D., M.D., director of research, Memorial Foundation for Neuroendocrine Research, and research associate in physiology, Harvard Medical School; J. M. D. Olmsted, Ph.D., professor of physiology, University of California; and Carl F. Schmidt, M.D., professor of pharmacology, University of Pennsylvania. Ninth edition. 8°, cloth, 1256 pp., with 124 tables and 387 illustrations. St. Louis: The C. V. Mosby Company, 1941. \$10.00.

America Organizes Medicine. By Michael M. Davis, Ph.D., chairman, Committee on Research in Medical Economics. 8°, cloth, 335 pp. New York and London: Harper and Brothers, 1941. \$3.00.

The Chemical Action of Ultraviolet Rays. By Carleton Ellis, B.S., and Alfred A. Wells. Revised and enlarged edition by Francis F. Heyroth, M.D., Ph.D., University of Cincinnati. 8°, cloth, 961 pp., with 159 illustrations. New York: Reinhold Publishing Corporation, 1941. \$12.00.

Wolf Child and Human Child: Being a narrative interpretation of the life history of Kamala, the wolf girl. By Arnold Gesell, M.D., Yale University. 4°, cloth, 107 pp. New York: Harper and Brothers, 1941. \$2.00.

Diseases Transmitted from Animals to Man. By Thomas G. Hull, Ph.D., director, The Scientific Exhibit, American Medical Association. Second edition. 8°, cloth, 403 pp., with 45 illustrations. Springfield, Illinois: Charles C Thomas, 1941. \$5.50.

Hemorrhagic Diseases: Photo-electric study of blood coagulability. By Kaare K. Nygaard, M.D., fellow of the Alexander Malthe Foundation for Research in Medicine, Surgery and Gynecology. 8°, cloth, 320 pp., with 59 illustrations. St. Louis: The C. V. Mosby Company, 1941. \$5.50.

The New International Clinics: Original contributions, clinics, and evaluated reviews of current advances in the medical arts. Edited by George Morris Piersol, M.D., professor of medicine, Graduate School of Medicine, University of Pennsylvania, Philadelphia. Vol. 1, N. S. 4, 1941. 8°, cloth, 304 pp., with 44 illustrations, and 19 tables. Philadelphia: J. B. Lippincott Company, 1941. \$3.00.

Manual of Clinical Chemistry. By Miriam Reiner, M.Sc., assistant chemist, Mount Sinai Hospital, New York. Introduction by Harry Sobotka, Ph.D., chemist, Mount Sinai Hospital. 12°, cloth, 296 pp. New York: Interscience Publishers, Incorporated, 1941. \$3.00.

An Introduction to Dermatology. By Richard L. Sutton, M.D., Sc.D., LL.D., F.R.S. (Edin.), emeritus professor of dermatology, University of Kansas School of Medicine; and Richard L. Sutton, Jr., M.D., L.R.C.P. (Edin.), assistant professor of dermatology, University of Kansas School of Medicine. Fourth edition. 8°, cloth, 904 pp., with 723 illustrations. St. Louis: The C. V. Mosby Company, 1941. \$9.00.

American Gynecological Society Transactions. Vol. 65 (1940). Edited by Richard W. TeLinde, M.D. 8°, cloth, 241 pp., with 77 figures and 73 tables. St. Louis: The C. V. Mosby Company, 1941.

Spermatozoa and Sterility: A clinical manual. By Abner I. Weisman, M.D., adjunct gynecologist, Jewish Memorial Hospital, and clinical assistant visiting gynecologist and obstetrician, Metropolitan Hospital, New York. With a foreword by Robert L. Dickinson, M.D. 8°, cloth, 314 pp., with 70 illustrations. New York: Paul B. Hoeber, Incorporated, 1941. \$5.50.

Blood Transfusion Association: Report concerning the project for supplying blood plasma to England. Narrative account of work and medical report. 8°, paper, 21 pp. New York: Blood Transfusion Association, 1941.

Surgery of Modern Warfare. Vol. I. By sixty-five contributors. Edited by Hamilton Bailey, F.R.C.S.; surgeon, Royal Northern Hospital, London. 4°, cloth, 480 pp., with 502 illustrations. Baltimore: Williams and Wilkins Company, 1941. \$10.00.

BOOK REVIEW

The Chinese Way in Medicine. By Edward H. Hunt, M.D. 8°, cloth, 189 pp., with 8 illustrations. Baltimore: Johns Hopkins Press, 1940. \$2.25.

This stimulating little volume seeks to place before the reader a rapid survey of a system of medical thought that is philosophical in conception and has proved adequate for the needs of an eastern Asiatic civilization.

The three lectures that form the basis for this book are: "The Universe and Man in Chinese Medicine," "The Founders and Chief Exemplars of Chinese Medicine," and "Some Distinctive Contributions of Chinese Medicine." The author develops in an admirable manner the three characteristic approaches of the Chinese way in medicine—the cosmic, the animistic and the medicamental. The thesis is presented that the Chinese have made significant contributions in the fields of medical literature, medicaments, physical therapy and diagnostic methods. Although this book may make its appeal to a strictly professional group, it is to be highly recommended to students in colleges of liberal arts, as well as to those in medical schools.

The New England Journal of Medicine

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VOLUME 224

APRIL 24, 1941

NUMBER 17

TUBERCULOUS INFECTION AMONG NURSES AND MEDICAL STUDENTS IN SANATORIA AND GENERAL HOSPITALS

PAUL DUFALT, MD†

RUTLAND, MASSACHUSETTS

THE fear of contagion from tuberculosis among medical workers is far from recent. Val salva, who lived from 1666 to 1723, avoided autopsies of those dying from phthisis, because he was afraid of contracting the disease. Morgagni did likewise to protect himself and his pupils from exposure. Laennec, who died from tuberculosis, was convinced that he had acquired his illness while doing post mortem examinations. In the middle of the last century, French army surgeons had already observed the high incidence of tuberculosis among the orderlies of the military hospitals in times of peace.

These clinical observations were to receive their scientific confirmation in 1865, when Villemin recognized the transmissibility of tuberculosis, and their undeniable proof in 1882, when Koch announced to the world the discovery of the tubercle bacillus. In that year, pulmonary tuberculosis entered automatically into the rapidly growing class of contagious diseases.

The medical profession, however, was slow to adopt a logical attitude toward the adequate protection of all those entrusted with the care of tuberculous patients. Not that some of its members were not aware of the possibilities of infection. On the contrary, as early as 1889, Cornet¹ reported on the epidemiology of tuberculosis in the German Catholic nursing orders for twenty-five years and found the death rate from that disease exceedingly high, especially among the young nuns. "A girl of seventeen," he wrote, "devoting herself to hospital nursing died on the average twenty-one and a half years sooner than a girl of the same age moving among the general population." Tuberculosis was responsible for 63 per cent of the total deaths among these nursing nuns. This appalling mortality is un-

derstandable if one remembers that Cornet's survey covered the period from 1864 to 1889, most of which was prior to the discovery of Koch's bacillus and even to the Pasteur era.

This warning stirred no response until 1910, when Hamel,² at the suggestion of Koch, inquired from 549 German institutions admitting tuberculous patients as to the morbidity from tuberculosis among their personnel. The survey included 2861 physicians and 14,140 nurses for the years 1906 to 1910. The rate of infection among them was found to be practically the same as that among the general population. This was in direct contradiction of Cornet's report.

Dublin,³ commenting on these figures, pointed out that the factors of age and duration of employment were not taken into account and that the reluctance of some of the nuns to submit to examination let a good many cases go unrecognized. Hamel's findings were, nevertheless, a long way from those of Cornet, and Dublin considered himself justified to conclude:

In view of the German figures and the personal experience of those who have long carried on America's tuberculosis work, more and more physicians and nurses should find themselves ready to enter this field of social service without the fears, usually present, of possible infection. With proper precautions taken, adults can engage in this work with well nigh perfect immunity.

The "proper precautions, up to the last few years, meant the hygienic disposal of the sputum. Recent events lead one to believe that this has been inadequate.

Dublin based his opinion on no less an authority than Trudeau, who wrote in a personal letter:

In the early days of the sanatorium, and for the past ten years, many of our employees, dining room maids and so forth were, as far as I know, healthy people. To my knowledge, none of these ever developed tuberculosis at the sanatorium.

*Read before the Worcester District Medical Society, October 9, 1940.
†Assistant superintendent, Rutland State Sanatorium.

The most authoritative American teachers and writers on the subject were then voicing a similar opinion. "Infection almost never occurs in sanatoria where the proper precautions are taken," Pottenger³ stated in the 1908 edition of his book. That the same opinion was prevalent in England, Germany and the United States is implied by what he added:

Although the Brompton Hospital, London, has treated more than 15,000 cases of tuberculosis during the past twenty years, yet, neither a nurse, a physician nor an attendant has become infected. The same record has been made in Falkenstein and Goerbersdorf, Germany, and in the Adirondack Cottage Sanatorium and Winyah in the United States. Here we have intimate association of patients and attendants for months and years with no infection occurring. We can safely say, then, that tuberculosis is only communicable when proper care is not used.

In 1917 he⁴ expressed the same belief:

The attendants of these institutions [sanatoriums and tuberculosis hospitals] instead of being prone to infection, seem to show even a smaller number of infections than occur in human beings generally.

Fishberg⁵ goes farther in the same direction. He quotes numerous French and German authorities, among them Saugman, who claims, "It is not dangerous for healthy adults to be coughed at by patients suffering from pulmonary or laryngeal tuberculosis." "During the thirty years of the existence of the Montefiore Hospital," writes Fishberg, "no nurse, orderly or physician has been observed to have been infected while attending to the needs of the tuberculous patients." He concludes, "Such facts have been quoted to disprove the transmissibility of tuberculosis, but in the light of our present knowledge, they merely prove that reinfection is impossible."

In 1924, Clark⁶ answered his own question, "Is caring for tuberculosis patients dangerous to the nurse?" by relating the experience of Aufrecht, who was unable to find a single case of infection among 263 nurses at the Madgeburg-Alstadt Hospital, where 3828 tuberculous patients had been admitted during the period 1880 to 1897, and that of Brunon, who studied the records of the Rouen hospitals for thirty years and found that nurses and attendants died of tuberculosis less often than the general population of that city.

In 1931, Fishberg⁷ endeavored to refute an article of Myers,⁸ and claimed to "know of no evidence that the incidence of tuberculosis in medical students is higher than that of other young men and women." In 1940, Brahdy⁹ concluded an article with the statement that: "The incidence of tuberculosis among hospital personnel is about the same as that in any similar group." He

makes an exception for nurses, whose higher rate of infection he attributes to their being tuberculin negative on entrance to the hospital.

The preceding quotations explain the impression prevailing among a good many to this day that a contact such as that of nurse to patient carries no danger of infection from tuberculosis.

From 1925 on, however, a decided change appeared in the figures and in the tone of the articles on this subject. Britton and Bollman¹⁰ and Shipman and Davis,¹¹ in this country, and Kirchner¹² and Mücke¹³ in Germany found the incidence of tuberculosis to be much higher among nurses than in the same age group in the community. Heimbeck,¹⁴ of the Oslo General Hospital, claimed in 1928 that 50 nurses out of 420, that is, almost 1 out of 8, developed tuberculosis in the course of their training. Reports of high morbidity rates from tuberculosis among interns, nurses and orderlies poured in from everywhere: 4.5 per cent, according to Fisher,¹⁵ of California; 29.1 per cent for one class of nurses at the Macon County Sanatorium, Illinois¹⁶; and 3 per cent in the New Zealand base hospitals.¹⁷ Geer¹⁸ found from 4.5 to 5.5 per cent at the Ancker Hospital, St. Paul, Minnesota, and Hedvall¹⁹ 5.3 per cent in probationary nurses at the Lund University Hospital in Sweden. Boynton²⁰ declared in 1939:

The tuberculosis infection rate is a hundred times greater in the student nurses on a general hospital service than in the students of the College of Education and five hundred times greater in student nurses on a special tuberculosis service than in the College of Education students.

Her study was carried out at the University of Minnesota Hospital.

Cases of infection of medical students have also come to the attention of epidemiologists. A wealth of material has been accumulated in various medical schools, in this country and abroad, showing that the rate of morbidity from tuberculosis among the second, third and fourth year medical students is generally greater than that among other young men and women of the same age group. Myers's²¹ first conclusion in an article written in 1933 was, "The incidence of tuberculosis among students and recent graduates of schools of nursing and medicine is so high that the disease may be looked upon as a serious menace to professional health workers." In 1939, Soper and Amberson²² surveyed the literature and gave their own figures in a comprehensive report. They noted an incidence of tuberculosis of 5.8 per cent among the medical students at the University of Pennsylvania in 1935-1936, decreasing gradually to 3.7 per cent in 1937-1938. Dr. Heath, of Harvard Medical School, wrote to Dr. Soper in 1938, "There

is no doubt that tuberculosis is the most important organic medical problem in the medical school." According to Soper and Amberson, however, Stanford University had only 1.0 per cent, Johns Hopkins 1.4 per cent, Yale a little more than 1 per cent and Columbia 0.4 per cent.

The incidence is higher abroad: Scheel²³ gives 23 per cent for the Oslo Medical School. The most recent and at the same time one of the most interesting reports comes from Lund University, Sweden, where Hedvall¹⁰ gives the figures listed in Table 1. This rate of infection

TABLE 1. *Incidence of Tuberculosis in the Different Faculties.*

FACULTY	NO. OF PERSONS EXAMINED	NO. OF CASES OF TUBERCULOSIS FOUND	TUBERCULOSIS IN DIFFERENT GROUPS	
			%	
Medical students	638	72	11	3
Philosophy students	1367	17	1	2
Theology students	409	12	2	9
Law students	488	9	1	8
Probationary nurses	434	23	5	3

among medical students is about the highest officially reported. The most enlightening part of Hedvall's report is the tracing of the main source of infection to the autopsy room. Samples from towels, trays and tables taken twenty-four hours after a necropsy examination contained tubercle bacilli on cultures, in spite of all precautions during the post-mortem procedure.

That the danger of contamination from this source may be serious is demonstrated by the following data obtained from various hospitals in Massachusetts. In 3766 post-mortem examinations at the Boston City Hospital in the years 1935-1939 inclusive, tuberculosis was found to be the primary or contributory cause of death in 285 cases, that is, at the rate of 7 per cent. Fourteen out of 236 cases, or 6 per cent, were reported from the Worcester State Hospital for 1937 and 1938. In the same years the Worcester Hahnemann Hospital had 3.8 per cent, the Worcester Memorial Hospital (Worcester) 2.7 per cent and St. Vincent Hospital (Worcester) 1.5 per cent. From the Worcester City Hospital comes the surprisingly low figure of 0.9 per cent for the years 1934-1938 inclusive. At the Buffalo General Hospital and Children's Hospital, Terplan²⁴ reported that the incidence of tuberculous lesions at autopsy of about 700 children and young adults was 5.9 per cent in those younger than seven years of age and 19.4 per cent in those between seven and eighteen.

The percentage of tuberculous foci found in the autopsy room of general hospitals indicates that there may be more lesions in their wards than one would suspect. Badger and Spink²⁵ noted

an annual average of 634 tuberculous patients admitted to the general wards of the Boston City Hospital from 1930 to 1934 inclusive. Ten per cent of the deaths from tuberculosis occurred in the general hospitals of upstate New York in 1936-1937,²⁶ and 20 per cent in the general hospitals of Massachusetts in 1939. Of 65,000 deaths from tuberculosis in the United States in 1933-1934, 5306 (7 per cent) occurred in tuberculosis departments of general hospitals.²⁷ In a recent x-ray survey of 4853 patients admitted at fifteen representative general hospitals, Plunkett and Mikol²⁸ found 2.6 per cent with pulmonary tuberculosis. This explains some seemingly paradoxical reports of higher incidence of tuberculosis among general-hospital nurses than among nurses at tuberculosis sanatoriums. There is less contact in the former institutions, no doubt, but that contact becomes more dangerous because it is unrecognized and because no precautions are taken.

EXPERIENCE AND EXPERIMENTS

My observations have paralleled the experience of those who have noted a high morbidity rate among their nursing personnel. From 1926 to 1936 inclusive, out of 174 healthy pupil nurses on admission to training, 16 developed tuberculous lesions demonstrable by x-ray, a morbidity rate of 9.2 per cent. They were all between the ages of eighteen and twenty-one. Of the 11 that were skin tested by the Mantoux method, 6 reacted positively, and 5 negatively. Four developed pleural effusions that cleared up spontaneously. Twelve showed parenchymatous lesions, but 8 of these never went beyond the minimal stage. Six had positive sputum. Fourteen took rest treatment for some time, varying between a few months to a year. Two refused to do so. Six received pneumothorax and one a phrenicectomy. Fourteen are now well. One is ill. One, who had been in contact with a tuberculous brother before entering the school, died. Three of the 16 nurses became ill from two to five years after they had left Rutland, and so far as they are concerned, the training school might well plead not guilty if it wished to do so. This would bring the morbidity rate down to 7.5 per cent.

To prevent further contagion, I have tried to determine the likeliest points of contamination in the immediate surroundings of the patients. The sputum is collected in a thick, oilpaper container and burned. This presents no difficulty. The droplets projected during coughing spells constitute the main problem. In spite of repeated instructions, some patients, because of thoughtlessness, neglect or lack of strength, fail to cover their mouths. Particles of sputum and saliva float

in the air for a short while and fall on the bed-covers, on the pillows and on the bedside tables, and may even reach the wall next to the bed. Other patients cover their mouths with their hands and contaminate the objects that they handle. One may easily judge from this that the dangers of infection vary greatly according to the habits and to the degree of illness of each person.

Cultures of tubercle bacilli were grown from the sterile water used to wash the bed sheets, the table, the walls and the floor of a room in which a particularly untidy patient had died the day before. The same procedure, repeated after the ordinary routine cleaning, — washing of walls, woodwork, floors, bedstead, table and chairs with soap and water, — still gave a positive result from the wall wash, but a negative one from the table and the floor washes. The experiment was carried out in several other rooms, with negative results. The sediment obtained from three floor sweepings in another room infected a guinea pig. No organisms grew from doorknob washes and from a basin of water kept on the bedside table of a very ill patient for twenty-four hours. No tubercle bacilli could be recovered from nose swabs of nurses returning from duty in the sickrooms or from the sterile water in which their masks had been left to soak after use.

The small scale on which these experiments were carried out detracts in no way from their value. They prove that tubercle bacilli are present in the immediate vicinity of tuberculous patients, and that their number increases with the stage of the disease, the severity of the cough and the lack of precaution taken by the patient.

DISCUSSION

The belief of the oldest observers, Valsalva, Morgagni, Laënnec and Villemain, after being partially disregarded by the medical writers of the early nineteenth century, has thus been exhumed and established on a solid foundation of facts and figures during the last ten or twelve years. The reason lies in the fact that the period from 1925 to 1940 has been illuminated by the light of the x-ray. There is no doubt that the morbidity from tuberculosis was probably as high in the twenty-five preceding years, but it could not be recognized clinically in time to be associated with the source of infection. The invasion of the lungs by the bacillus took place silently, without outward manifestations, or under the disguise of colds, gripes, influenzas and so forth, as it often does even today. It receded spontaneously in many cases or smoldered during the years of training to flare up later when the nurses had left the hospital and had been lost to sight.

Skin testing has been an even more sensitive gauge than the x-rays to determine the rate of infection in nurses and students. Of 126 nurses tuberculin tested at the Boston City Hospital, 60 per cent were positive on entering the school, and 90 per cent after their three years of training.²⁹ Of 70 student nurses negative to tuberculin at the beginning of their training, all but 10 were positive at the end, according to Amberson and Riggins.³⁰ Most of the reports show similar figures.

It is also possible that the increase in the incidence of tuberculosis noted during the last decade may be due, in part, to the enormous amount of study required from student nurses. Added to the work, the weight of this adverse factor may be sufficient to tip against them the sensitive scale in which their acquired resistance would otherwise counterbalance repeated exposures.

Much has been said and written on the question of allergy, and much confusion has resulted. On one point, most observers agree. The number of lesions recognizable by x-ray study and the number of clinical infections are far greater among the tuberculin-negative reactors than among the positive ones. This led some European and Canadian clinicians to immunize the former group by means of BCG. Among others, Heimbeck's³¹ statistics point to a remarkable degree of protection resulting from the use of this vaccine.

CONCLUSIONS

It seems generally accepted that the danger of contracting tuberculosis constitutes a serious hazard for young persons entering training school, and to a lesser degree, for medical students. This being so, the logical move is toward prophylaxis, and the following preventive measures are suggested:

No nurse, orderly or wardmaid should be permitted to work in a sanatorium before the age of twenty-one.

The affiliation of nurses to sanatoriums from general hospitals should be postponed to the third year of training.

The diet should be sufficient and well balanced. The work should not be too hard nor the hours too long. The living quarters should be spacious and well aerated. A false economy has often inspired shortsighted policies in regard to the three preceding items. The compulsory eight-hour day in state hospitals is commendable. A month's vacation a year is desirable.

All nurses should be skin tested, x-rayed, weighed and examined on admission and every four to six months during their training.

Vaccination of the tuberculin-negative reac-

tors by means of BCG is current practice in many European hospitals, and it seems to offer considerable protection. Medical opinion in this country is not yet prepared for the adoption of this protective measure.

Nurses should wear gauze masks of sufficient thickness while taking care of patients with open tuberculosis, especially while making beds and giving baths. They should be instructed not to shake the blankets, pillow-cases, bathrobes and so forth. They should be careful to wash their hands as soon as they are through with one patient, and to change their uniforms before leaving the ward. The soiled linen should be collected in bags and sent immediately to the laundry. The bags should be emptied directly into the washer with as little handling as possible.

All dishes, trays, glasses and so forth should be sent to the central dishwasher and sterilized by live steam. (Recent advances in the utilization of ultraviolet rays offer hope for their practical application in the field of hospital disinfection.)

Patients must be instructed not to cover their mouths with their hands, when coughing, but with paper napkins, which are thrown into paper bags pinned to the bedside tables.

In general hospitals, an effort should be made to detect patients suffering from pulmonary tuberculosis. If the cost of a routine chest film is considered too high, that of a fluoroscopic examination is negligible. The efficiency of the screen does not equal that of the film, but it is 80 per cent better than that of the stethoscope and 100 per cent better than no chest examination.

Where these or similar measures have been enforced, the rate of infection among nurses and hospital personnel has been brought below that of the general population.

REFERENCES

- 1 Quoted by Norris G W and Landis H R M. *Diseases of the Chest* Fifth edition 1927 pp Philadelphia W B Saunders Co 1933 P 256
- 2 Dublin L I. cited by Whitney J. Tuberculosis among nurses. *Am J Nursing* 35 367-375 1935
- 3 Fottenger, P M. *The Diagnosis and Treatment of Pulmonary Tuberculosis* 372 pp New York William Wood & Co 1903 P 107
- 4 *Idem Clinical Tuberculosis* Vol II 713 pp St Louis C V Mosby Co 1917 P 519
- 5 Fishberg M. *Pulmonary Tuberculosis* Third edition 891 pp Philadelphia Lea & Febiger, 1922 P 148
- 6 Clark W R. Is caring for tuberculous patients dangerous to the nurse? *Pacific Coast J Nursing* 20 97-101 1924
- 7 Fishberg M. Recent facts on transmission of tuberculosis. *J A M A* 97 661 1931
- 8 Myers J A. Recent facts on transmission of tuberculosis. *J A M A* 97 316-319 1931
- 9 Bradby L. Tuberculosis in hospital personnel. *J A M A* 114 102 106 1940
- 10 Britton J A and Bollman E B. The relation of occupation to tuberculosis in Chicago. *Transactions of the 21st Annual Meeting of the National Tuberculosis Association* Minneapolis June 16-20 1925 Pp 442-449
- 11 Shipman S J and Davis E A. Tuberculin hypersensitiveness and tuberculous disease among nurses. *Am J Nursing* 28 69-77 1928
- 12 Karchner M. Tuberkuloseerkrankungen und Todesfälle bei Ärzten und dem Pflegepersonal und die Frage der Dienstreinigung. *Ztschr f Tuberk* 43 345-354 1935
- 13 Mücke. Die Tuberkulose des Pflegepersonals. *Beitr z klin f Tuberk* 64 155-159 1926
- 14 Heimbeck J. Immunity to tuberculosis. *Arch Int Med* 41 336-342, 1928
- 15 Fisher, S A. cited by Whitney J. Tuberculosis among nurses. *Am J Nursing* 35 367-375 1935
- 16 Lindberg D O N. Incidence of pulmonary tuberculosis among students in nurses training schools. *Illinois M J* 63 173-175 1935
- 17 Jones D W C. An inquiry into the incidence of tuberculosis among nurses in a New Zealand hospital. *Tubercle* 15 59-67 1933
- 18 Geer E K. Primary tuberculosis among nurses. *Am Rev Tuberc* 29 68-97 1934
- 19 Hedvall E. The incidence of tuberculosis among students at Lund University. *Am Rev Tuberc* 41 70-80 1940
- 20 Boynton R E. The incidence of tuberculous infection in student nurses. *Am Rev Tuberc* 39 671-674 1939
- 21 Myers J A. Types of tuberculous lesions found in the chests of students of nursing and medicine. *Am Rev Tuberc* 38 93-117, 1933
- 22 Soper, W B and Amberson J B Jr. Pulmonary tuberculosis in young adults particularly among medical students and nurses. *Am Rev Tuberc* 39 932-1939
- 23 Scheel O. La tuberculose parmi les étudiants en médecine à Oslo et sa prévention par la vaccination au BCG. *Rev de la tuberc* 55 1529-541, 1935
- 24 Terplan K. Anatomical studies on human tuberculosis. *Am Rev Tuberc* Supp 42 11-6 1940 P 42
- 25 Badger T L and Spink, W W. Sources of tuberculous infection among nurses. *Am Rev Tuberc* 39 1191-1206
- 26 Mikol E X. Ditt. New York State. The place of death
- 27 Ostway W H, Jr. *Chicago American Hospital Association* 1930 P 17
- 28 Plunkett R E. and Mikol E X. Unrecognized tuberculosis in general hospitals. *Am Rev Tuberc* 41 381-387 1940
- 29 Badger, T L and Spink W W. First infection type of tuberculosis in adults: a five year study of student nurses at the Boston City Hospital. *New Eng J Med* 217 424-431 1937
- 30 Amberson J B and Higgins H M. Tuberculosis among student nurses: a five year study at Bellevue Hospital. *Ann Int Med* 10 156-165 1936
- 31 Heimbeck J. Tuberculosis in hospital nurses. *Tubercle* 18 97-100 1936

HEMATOMA OF THE BRAIN*

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THE formation of a large localized hematoma within the substance of the brain is rather uncommon. The term, "hematoma of the brain," is used so that the pathologic condition under discussion may be strictly limited to large circumscribed collections of extravasated blood that are completely within the brain substance. Petechial or very small hemorrhages, massive cerebral hemorrhages rupturing into the ventricles or subarachnoid space and all circumscribed hematomas secondary to brain neoplasm are excluded from consideration. The fact that most hematomas of the brain produce signs and symptoms resembling the syndrome of an expanding intracranial neoplasm and that many of them respond well to surgical treatment is, perhaps, not generally appreciated. Comparatively few reports of such lesions that have been operated on can be found in the literature.

Four cases of hematoma of the brain have been collected from the records of the Neurological Institute during the last fifteen years, and in all cases surgical treatment was successful. In every case the hematoma was intracerebral and the preoperative diagnosis was either neoplasm or abscess.

CASE REPORTS

CASE 1. (N.I. 11910) N.M., a 59-year-old man, was admitted to the Neurological Institute on March 21, 1932, complaining of speech difficulty, occasional frontal headache and slight vertigo. The onset of his illness was 1 month before admission. In the evening, while playing cards and without any warning, he suddenly became unable to speak or to call names, and reeled on attempting to walk. The next day he was confused and spoke in a jargon, but at no time was he unconscious. He vomited on this day. He was admitted to a hospital, where an operation "through his nose" revealed pus. Two or three months prior to admission, he had noticed a momentary aphasia; he could not call the names of the stations while working as a subway guard. His son said that he had noted this difficulty in calling names about two years previously. He had never had a convulsion.

The patient was a well-built, vigorous man with a blood pressure of 160/90. There was a moderate arteriosclerosis, the heart was slightly enlarged, and the sounds were somewhat indistinct. There were a few transitory rales and a slight emphysema. The olfactory sense was poor on both sides. The optic disks were blurred, and there was a right homonymous hemianopia. The pupils were

sluggish to light. There was a right hyper-reflexia, and a nominal aphasia. The diagnosis on admission was a left-temporal-lobe neoplasm.

Examination of the blood revealed a red-cell count of 4,500,000 with a hemoglobin of 81 per cent, and a white-cell count of 9100, with a normal differential. The blood and spinal-fluid Wassermann reactions were negative, and the blood chemical findings normal. The first spinal fluid showed a + test for globulin, 75 mg. per 100 cc. total protein and 4 lymphocytes per cubic millimeter. Two subsequent fluids had negative globulin reactions; the total protein was 37 and 21 mg. per 100 cc., and lymphocytes numbered 18 and 2, respectively. The urine was normal. X-ray examination of the skull showed no disease; the pineal gland was not visualized. The various diagnoses considered were: left-temporal-lobe neoplasm; thrombosis of the left lenticulostriate artery; single acute hemorrhage of the brain (branch of the left mid-cerebral artery). Encephalography revealed a shift to the right of the lateral and third ventricles. The hippocampal recess was present on the right but absent on the left side, and the left temporal horn was only partially outlined. The findings were considered to indicate a left fronto-temporal tumor.

The patient was transferred to the surgical service, where a preoperative diagnosis of a left temporal meningioma was made. A left temporal osteoplastic flap was turned down by Dr. Byron Stookey. On the cortex of the temporal lobe was an area, about 5 cm. in diameter, that showed an increased vascularity. The upper gyrus of the temporal lobe, for a space of 2 or 3 cm., was almost canary yellow, whereas the surrounding gyri were quite white. A cannula was passed through the yellow degenerated area, and no fluid was found. On incision, a massive blood clot was found at a depth of 2 cm. Microscopic examination of the fresh tissue, including sections from the adjacent brain substance, was reported as "hemorrhage into degenerated tissue." The clot, which measured 2 by 3 by 2 cm., was removed, the edges of the cortex were allowed to come together, and the dura was closed. The pathological report showed that the tissue was composed of an edematous glial mat in which there were many compound granular cells containing hemosiderin, fat and masses of red cells. The diagnosis was: zone of reaction about an old cerebral hemorrhage.

The patient had a prompt recovery, and when he was discharged on May 10, 1932, aphasia was still present. The follow-up examination on August 2, 1933, showed that the aphasia persisted to a moderate degree. When he was last seen on August 2, 1934, two and a half years after operation, his condition was normal except for a mild nominal aphasia.

CASE 2. (N.I. 29949) L.P., a 15-year-old girl, was admitted to the Neurological Institute on August 23, 1936, complaining of headache, poor vision, nausea and vomiting. Two years before admission she had a generalized convulsion; previous to this she had frontal headaches and poor vision. Nine days before admission she began to have a left-sided headache, drowsiness, photophobia and nausea. The drowsiness increased, and the patient was

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mitted in stupor. There was no history of trauma.

Examination revealed a well-nourished girl who was rosy and appeared acutely ill. There was a right lower facial weakness, the right abdominal reflexes were absent, and all the deep reflexes were absent except the right ankle jerk, which was increased. There was a right Babinski reaction. The fundi showed 1 to 2 diopters of papilledema on the right, and 4 to 5 diopters on the left. Pinprick was felt better on the left, and the patient moved the left extremities more freely than the right. The admission diagnosis was a left temporal neoplasm.

Examination of the blood showed a red cell count of 250,000 with a hemoglobin of 78 per cent, and a white cell count of 13,450 with 87 per cent polymorphonuclears. The blood Wassermann reaction was negative and the urine normal. X-ray studies of the skull showed that the middle meningeal channels were slightly larger than on the right.

On August 24, 1936, a left osteoplastic flap was turned by Dr. Fritz J. Cramer. Just under the tense dura a soft area was found in the center of the exposure. A needle was inserted to 4 cm., where a definite resistance was felt; the needle was forced deeper and about 25 cc of dark, bile-colored fluid was obtained. The dura was then opened widely. The exposed cortex showed wide, shallow gyri and a narrowing of the sulci, giving the impression of an underlying glioma. An incision was made in the posterior portion of the superior temporal gyrus to a depth of 3 cm. a large collection of old clotted blood was found. Several small, cystlike collections of clot were also found, and the impression was gained that the lesion was lobulated. A specimen was taken from the lesion and also from the yellow cortex. The surgeon stated that there were two hematomas, one about to rupture and one deeper and more solid. The pathological report was one old and one recent hemorrhage in the cerebrum.

The postoperative course was uneventful, and when the patient was discharged on September 5, 1936, she still had an unsteady gait and hyporeflexia.

In the summer of 1937, the patient had a recurrence of her original symptoms, but without any disturbance of consciousness. Repeated examinations disclosed only a slight increase of the deep reflexes on the right side and some suppression of associated movements on the right. Needle exploration in the region of the former hematoma showed no blood or fluid, and a ventriculogram revealed only slight evidence of a space-occupying lesion on the left. The patient slowly improved and left the hospital in good condition. She has been followed for three and one-half years, and there has been no essential change in her condition.

CASE 3 (NI 36399) A M., a 34-year-old woman was admitted to the Neurological Institute on January 4, 1938, in a semistuporose condition. She was found in this condition by her husband on December 29, 1937. She was unable to talk, but she could be aroused by stimulation. It was noted that she had a marked weakness of the right arm and leg. Her condition did not improve and after 4 days, she was sent to a hospital on the following day. She was admitted here. In 1923 she had been struck by a car; she was unconscious for 24 hours and was in bed for 4 months. A hysterectomy and an oophorectomy were performed in 1935. Not long after this, the patient became critical of those around her. She was untidy, irritable, and, at times, appeared dazed. In January, 1936, 2 years before admission, her husband found her in a semistupor; she was unable to walk or talk, but appeared to

be as well as usual on the following morning. In March, 1937, she was again found in the same condition, on recovery she complained of weakness of the right arm for several weeks.

Examination revealed a complete right hemiplegia, including the face, with all concomitant signs. The patient could not form words and understood very little that was said to her, but on repeated commands she could perform simple acts. Sensation was diminished on the right side. The right pupil was slightly larger than the left, but both pupils reacted to light and accommodation. The fundi showed a high degree of myopia and slight papilledema. The admission diagnosis was a left frontal neoplasm.

The blood count, urinalysis and blood Wassermann reaction were normal. The spinal fluid pressure was 420 mm. of water, the fluid was xanthochromic and contained 66 lymphocytes per cubic millimeter and 220 mg. of protein per 100 cc., and gave a +++ test for globulin. The gold sol curve was normal. X-ray examination of the skull showed moderate atrophy of the posterior clinoids and dorsum sellae.

On January 7, a ventriculogram showed evidence of a tumor in the left posterior frontal region. The patient was returned to the operating room, and a left frontoparietal flap was turned under local anesthesia by Dr. Byron Stookey. A large hematoma was found deep in the brain at the middle portion of the mid frontal and ascending frontal convolutions. The clot extended to a depth of 4 or 5 cm. and was surrounded by degenerated brain tissue. The pathological report of the tissue removed at operation was encephalomalacia and recent hemorrhage into the brain substance.

The patient gradually became brighter and tried to talk. She slowly regained the use of the right lower extremity. She was discharged on February 23, when she could walk quite well, but the right arm was still spastic and the aphasia was still present. Reexamination in February, 1940, showed an improvement in the aphasia; the patient could walk for a considerable distance. During the last two years, she has had occasional convulsions.

CASE 4 (NI 41189) H F., a 47-year-old man, was admitted to the Neurological Institute on February 28, 1939, with fever and delirium. Three weeks before admission the patient had a chill, with fever and aching muscles. On the next day he complained of severe headache over the left frontal area, he had a temperature of 101°F and a rapid pulse. Since then he had had a dull, left-sided headache, but after one week, he returned to work, although he was drowsy and depressed. On February 20, he was unusually drowsy and acted strangely. Instead of going to work, he confabulated with his wife and sneaked back to bed. In the afternoon he went to his club and borrowed \$50 for no good reason. While there he had his first visual complaint, he bumped into things, and he could not read. He had no diplopia but had marked dizziness, and he could not sign his check. After returning home he had projectile vomiting for the rest of the day and night. This was accompanied by a left-sided headache that soon became very severe.

On admission the patient was delirious, unco-operative and under heavy sedation, the temperature was 104°F. He had a pyknic habitus and was obese. The chest was normal. He was unable to walk, but had no demonstrable muscular weakness. The deep reflexes were hypotonic, and there was no Babinski reaction. Sensation was normal. The disks could not be seen well, the pupils reacted to light and accommodation; there was some

TABLE 1. *Summary of Cases Reported in the Literature.*

AUTHORITY	AGE	SEX	ETIOLOGIC FACTORS	INITIAL SYMPTOMS	CLINICAL COURSE	OPERATION	LOCATION OF HEMORRHAGE	OUTCOME
Cushing ⁴ (1933)	37							
	40	M	Trauma, high blood pressure	Unconsciousness	Thirty six hr later developed right hemiplegia, B P 300, P 50	Craniotomy and puncture	Left frontoparietal	Recovered, died later
Russell and Sargent ⁵ (1909)								
			Hypertension	Unconsciousness	Right hemiplegia and aphasia	Craniotomy	Left frontoparietal	Recovered
	42	M	Trauma	Unconsciousness (short)	Progressive to coma 24 hr later	Craniotomy and incision	Right temporal (large)	Recovered
	62	M	Trauma	Unconscious (10 hr)	Progressive to coma, 42 hr later had sudden hemiplegia	Craniotomy	Right temporal	Recovered
Bagley ⁶ (1932)	30	M	Trauma	Next day had headache	Gradual onset of intracranial pressure, 18 days later had hemianopia	Craniotomy	Right temporal (deep)	Recovered
	48	M	Arterio sclerosis	Focal convulsions (2 yr)	Gradual stupor and hemiparesis, aphasia and papilledema 16 days later	Craniotomy and incision	Left temporoparietal (extensive)	Died
	39	F	None	Sudden headache	Next day stupor, progressed to coma on 6th day, papilledema but no definite paralysis	Craniotomy and incision	Left frontoparietal (extensive)	Recovered, died 10 days later
	49	M	Syphilis?	Slowly became drowsy and confused	Gradual stupor, papilledema and sudden hemiparesis on 14th day, and worse on 20th day, B P 210/55	Craniotomy	Left temporal (too large to remove)	Died 24 hr later
	43	M	None	Sudden headache and confusion	Gradual progress, developed signs of left cortical lesion and hemianopia, worse on 12th day	Craniotomy and aspiration (30 cc)	Left frontal	Recovered
	35	M	None	Sudden hemiparesis, stupor	Progressive to coma and complete hemiplegia, critical on 12th day	Craniotomy and aspiration (40 cc)	Temporal	Second operation 5 mo later, recovery
	34	M	None	Sudden headache and hemiparesis	Gradual progress until on 19th day developed coma and complete hemiplegia	Right temporal decompression	No hematoma found (probably present)	Recovered
	14	M	Initial smoking	Vomiting	Unconscious soon, 5 days later had aphasia and right hemiplegia	Craniotomy and incision	Left temporal	Recovered
	40	F	Hypertension	Dizziness and diplopia	Soon had right hemianesthesia, hemiparesis and hemianopia, aphasia on 3rd day	Craniotomy and incision	Left occipital	Recovered, sudden death 6 mo later
de Luvereyns ⁴ (1934)	?	M	Trauma	Concussion and confusion	On 4th day had right hemiparesis and headache, increasing stupor, P 52 on 11th day	Craniotomy and evacuation (20 cc)	Left parietal	Recovered
	15	F	Trauma	Unconscious short time	Gradual paresis and anesthesia of left forearm, became critical on 14th day	Trephine and puncture	Right parietal	Recovered
	52	F	Trauma	Semicoma right hemiparesis	Next day focal convulsions of face and arm, aphasia on 3rd day	Craniotomy and evacuation (50 cc)	Left frontoparietal	Recovered
	21	M	Trauma	Headache	In 3 days had facial paresis after drainage of extradural hematoma	Craniotomy and evacuation (15 cc)	Left frontoparietal	Recovered
	28	M	Trauma	Short loss of consciousness	Rapid progress to coma in 8 hours with facial paresis	Trephine and puncture	Left frontal	Recovered

Penfield⁷
(1933)

disassociation of the extraocular muscles, and nystagmus was present on lateral gaze. He was disorientated and had delusions. The blood pressure was 150/90. The admission diagnosis was a right frontotemporal brain abscess.

Blood examination showed a red-cell count of 3,740,000 with a hemoglobin of 60 per cent, and a white-cell count of 11,350 with 86 per cent polymorphonuclears; achromia, polychromatophilia and anisocytosis were present. Examination of the urine showed a ++ test for albumin, a + test for glucose and a + test for bile, with a few red and white cells per high-power field, and some granular casts. The spinal fluid was clear and had 8 white-blood cells and 5500 red-blood cells per cubic millimeter; the total protein was 68 mg. per 100 cc., and there was a + test for globulin. Culture of the fluid was negative. X-ray examination showed questionable atrophy of the posterior clinoids and dorsum sellae and changes that suggested early Paget's disease.

The patient was transferred to the surgical service, where it was thought that he had a right frontotemporal brain abscess. On the day of entry a right temporal decompression was done by Dr. Clement B. Masson. Following this operation, the patient's condition improved somewhat. On March 11, an encephalogram revealed a mass involving the right occipital and parietal lobes. A left homonymous hemianopia was found by the eye consultant. On March 14, a right parietotemporal flap was turned down by Dr. Masson. The cortex over the parieto-occipital region was rather soft, and there was a small, yellow discolored area in the posterior part of the operative field. This was incised, and a large hematoma, about the size of a lemon, was found at a depth of 3 cm. in the posterior part of the parietal and the greater part of the occipital lobes. Evacuation was done, and the patient made an uneventful recovery. Pathological examination showed encephalomalacia and hemorrhage in the cerebrum.

The patient was discharged on March 30, with a slight improvement in his visual fields, and was otherwise apparently well. He had no complaints, except occasional feelings of "nervousness," until June 15, when he became unconscious and was said to have a blood pressure "over 280." During the subsequent 6 months, he had 3 similar attacks, each of which lasted 15 minutes. He was readmitted on January 3, 1940, with a diagnosis of paroxysmal hypertension; the blood pressure was 205/140. A bilateral splanchnic resection was done in two stages. Following this, the patient improved greatly and the blood pressure dropped to 150/90 and remained at this level until he was discharged on February 10.

Heusner, in 1888, first reported an intracerebral hematoma successfully treated by trephination and puncture—the second case in the series collected by de Lauwereyns.¹ Since then a study of the literature has revealed 36 proved cases treated by surgery and 1 probable case that was relieved by trephination only, Kron and Mintz² reporting the only case of an intracerebellar hematoma. The greater number of these cases were reported after Naffziger and Jones's³ paper in 1928. Probably there are many unrecognized cases and some cases surgically treated but not reported. The essential points of the cases found in the literature are given in Table 1.

ETIOLOGY AND PATHOLOGY

With the exception of those cases in which the signs and symptoms follow soon after an injury, the causative factors often are not readily discernible. In 50 per cent of the cases there was a history of trauma to the head, usually of a considerable force, although in some cases the injury was slight and did not produce unconsciousness immediately. Some patients recovered from the initial symptoms, and a latent period, of varying extent, intervened before the development of the syndrome leading to surgery. When this latent period lasted from one to fifteen years, the relation of the previous trauma was not always clear.

TABLE 2. Etiologic Factors in All Cases.

FACTOR	No. of Cases
Trauma	22
Hypertension	4
Arteriosclerosis	2
Syphilis (doubtful)	1
Embolus	1
Otorrhea, prolonged	1
Coryza	2
Vomiting	1
None found	10

In 25 per cent of the cases no etiologic factor could be found; in the remaining 25 per cent vascular disease was present only six times. Two cases followed shortly after an upper respiratory infection. A summary of the etiologic factors is given in Table 2. Figure 1 shows that most cases—82 per

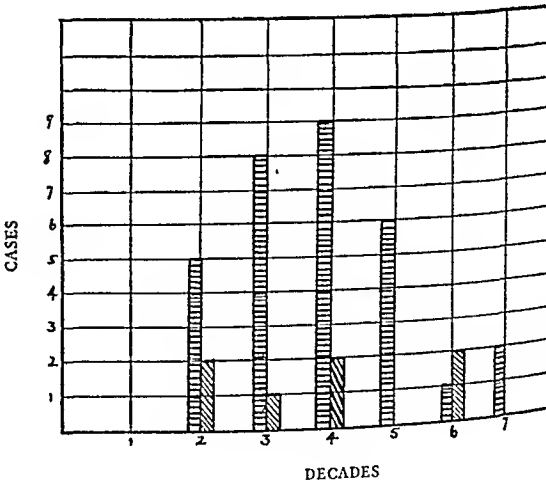


FIGURE 1. Age and Sex Incidence (2 cases omitted). The horizontally lined blocks represent males; the cross-hatched ones, females.

cent—occurred in men and were distributed throughout all the age groups, although none were found in the first decade. The location of the lesion is given in Table 3.

The post-traumatic hematomas are rather easily recognized, especially when the trauma produces symptoms that gradually progress to coma and when focal signs appear. Nevertheless, those that have a free interval and then a slow, progressive course are often mistaken for a neoplasm and in most cases cannot be differentiated by the most diligent investigations. The etiology of the so-called "spontaneous hematomas" is obscure, especially in those cases in which the onset is slow

TABLE 3. *Location of Hematoma in All Cases.*

LOCATION	NO OF CASES
Frontal	8
Frontoparietal	10
Temporal	10
Temporoparietal	3
Temporo-occipital	2
Parietal	6
Parieto-occipital	1
Occipital	1

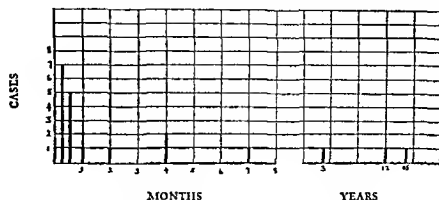
and the progress is intermittent over a long period of time.

The mechanism of the fundamental pathologic process is obscure. Various authors have thought that simple fatty degeneration of the small arteries is an important factor in the development of spontaneous intracerebral hemorrhage in children. Bagley⁶ believed that spontaneous hemorrhage, either meningeal or intracerebral, was often due to the rupture of an aneurysm caused by arteriosclerosis, syphilis, trauma, infection or congenital defects. Craig and Adson⁸ have stated that the bleeding probably was due to venous rupture. Alexander and Putnam¹³ also think that venous thrombosis is an important factor in the development of many intracerebral hemorrhages. Many other authors¹⁴ have investigated intracerebral hemorrhage, but none have explained why some cases have a massive hemorrhage or an ordinary capsular stroke and why others result in hematoma formation.

The content of the hematoma varies according to the age of the lesion. In early cases there is almost unchanged blood or fresh clots, whereas the late lesions may be cystic and show, as Robinson¹² has stated, only gitter cells containing blood pigment adjacent to the capsule as evidence that the cyst originally was a hematoma. The development of a well-marked capsule, as described by Robinson and also by Douglas,¹⁶ is unusual; complete cicatrization of the hematoma has never been recorded, although multilocular cyst formation may occur. Usually there is only a glial and connective-tissue reaction in the brain substance surrounding the extravasated blood. In some cases there is laminated clot, which suggests recurrent bleeding.

DIAGNOSIS AND TREATMENT

As already mentioned, the majority of the intracerebral hematomas come to operation with the diagnosis of brain neoplasm, although the early post-traumatic cases are usually recognized. The time that may elapse between the trauma and operation is extremely variable (Fig. 2); the earliest

FIGURE 2. *Elapsed Time between Trauma and Surgery (2 cases omitted).*

operation was done eight hours after the injury, whereas the latest operation, in Case 3 of the group reported in this paper, did not take place until fifteen years after the trauma. The most favorable cases for operation seem to be those in which the development of the syndrome of increased intracranial pressure is gradual and accompanied by signs of a lesion implicating the more accessible areas of the brain. In these patients, the motor fibers in the internal capsule are involved by pressure from a distance and the resulting paralysis is not complete. However, it is possible that a certain number of slowly increasing massive intracerebral hemorrhages might respond favorably to aspiration before rupture takes place; such a case was cited by de Lauwereyns¹ and is included in Table I. It is interesting to mention that Craig and Lipscomb¹⁷ have reported a successful operation in a case of intraventricular hemorrhage due to a hemangioma in the wall of the lateral ventricle. Puech, Rappoport and Brun¹⁸ have described the removal of localized intraventricular hemorrhages. In some cases of intracerebral hematoma, single or repeated aspirations are sufficient for a cure; in others, incision of the cortex and evacuation of the fluid and clots are necessary. Encephalography or ventriculography may be required for accurate localization.

PROGNOSIS

There were 9 deaths in the group of 41 cases in which operation was performed, a mortality of 22 per cent. Two deaths were due to pneumonia on the tenth and fourteenth days after operation, and 1 resulted from a known pre-existing *Streptococcus viridans* infection. If these

deaths were excluded, the surgical mortality would be 15 per cent.

SUMMARY

Four cases of intracerebral hematoma are reported that were treated successfully by surgery. Thirty-seven other cases were found in the literature. Most of these cases responded well to surgical treatment.

REFERENCES

- 1 de Lauwereyns, J. Hématome intracérébral isolé. Évacuation. Guérison. *Bull et mém Soc nat de chir.* 60:228-235, 1934
- 2 Kron, I. and Mintz, W. Kleinhirnbrutung, geheilt durch Operation. *Deutsche med Wchnschr* 53:1054, 1927
- 3 Naffziger, H. C. and Jones, O. W. Late traumatic apoplexy, report of three cases with operative recovery. *California & West Med* 29:361-364, 1928
- 4 Cushing, H. The blood pressure reaction of acute cerebral compression, illustrated by cases of intracranial hemorrhage. *Am J M Sc* 125:1017-1044, 1903
- 5 Russell, A. E. and Sargent, P. Apoplecticiform cerebral haemorrhage operation, evacuation of blood, slow improvement. *Proc Roy Soc. Med* (Neurological Section) 2:44-51, 1909
- 6 Bagley, C., Jr. Spontaneous cerebral hemorrhage: discussion of four types with surgical considerations. *Arch Neurol & Psychiat* 27:1133-1174, 1932
- 7 Penfield, W. The operative treatment of spontaneous intra cerebral hemorrhage. *Canad. M. A. J.* 28:369-372, 1933.
- 8 Crig, W. McK. and Adson, A. W. Spontaneous intracerebral hemorrhage: etiology and surgical treatment, with a report of nine cases. *Arch Neurol & Psychiat.* 35:701-716, 1936
- 9 Kaplan, A. Cerebral apoplexy: two recoveries following surgical intervention. *New York State J. Med* 37:934-938, 1937
- 10 Doughty, R. G. Posttraumatic delayed intracerebral hemorrhage. *South. M. J.* 31:254-256, 1938
- 11 Luruelle, L. and Masson-Vermory, L. Hématome intracérébral non traumatique. opération — guérison. *J. belge de neurol et de psychiat.* 38:495-503, 1938.
- 12 Ficker, A. D. and Love, J. G. Posttraumatic cerebral hemorrhage with delayed symptoms simulating brain tumor: report of case. *Proc Staff Meet., Mayo Clin.* 14:107-109, 1939
- 13 Alexander, L. and Putnam, T. J. Pathological alterations of cerebral vascular patterns. *The Circulation of the Brain and Spinal Cord* 14. Pp 471-543
- 14 Association for Research in Nervous and Mental Disease. *The Circulation of the Brain and Spinal Cord. A symposium on blood supply.* Vol 11. 790 pp. Baltimore: Williams & Wilkins Co., 1938
- 15 Robinson, G. W. Encapsulated brain hemorrhages: a study of their frequency and pathology. *Arch Neurol. & Psychiat* 27:1411-1414, 1932.
- 16 Douglas, R. G. A case of recent and old haemorrhages of the brain. *Canad. M. A. J.* 15:638, 1935
- 17 Craig, W. McK. and Lipscomb, W. R. Intraventricular hemorrhage simulating brain tumor: successful surgical treatment. *Proc Staff Meet., Mayo Clin.* 13:526-528, 1938
- 18 Puech, Rappoport and Brun. A propos de deux cas d'hémorragie intra-ventriculaire guéris par le traitement chirurgical. *Rev neurol* 63:913-928, 1935.

HYPOTHYROIDISM IN INFANTS AND CHILDREN*

With Reference to the Ultimate Prognosis Concerning Intelligence and to the Withdrawal of Thyroid Therapy as a Diagnostic Measure

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ALTHOUGH cretinism has for many years been known to result from deficiency of thyroid secretion, and although thyroid has had wide use in its treatment, an exact basis for a clear statement of the fate of treated cretins is still wanting. This is particularly true of eventual mental growth. The present study represents an attempt to secure more accurate information.

Lucas,¹ in 1927, presented the consensus when he said that treatment is usually followed by satisfactory physical results if begun early, although normal mentality is almost never attained; also, if the condition is recognized early, the continued administration of thyroid may produce a normal adult, but if treatment is delayed until the symptoms are so definite that the diagnosis is perfectly obvious, in most cases the child never gains actual normality.

Wieland² stated that results were less good in

so-called "early infantile" or congenital athyreosis than in acquired myxedema of children or adults; he pointed to hopeful cases that were diagnosed and treated soon enough, but in patients untreated for years he noted a poor response to treatment, particularly in intellectual development.

Fordyce,³ in 1933, after pointing out that the deficiency of thyroid may be of any degree, said that when careful treatment was begun in infancy and conscientiously continued, the ultimate prognosis was on the whole very good, although always uncertain. Some patients passed through childhood indistinguishable physically and mentally from normal children, and grew up into responsible citizens; others, however, responded only partially and became physically or mentally retarded, or both.

Holt and McIntosh,⁴ in 1936, stated, "We have not seen normal mental development, even in cases in which treatment was begun during the first year of life."

Rolleston,⁵ in 1934, emphasized that the earlier in life thyroid deficiency began, the less likely was well-marked benefit to result from thyroid therapy. Further, the earlier this treatment was started, the better were the prospects of success.

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†During the years 1933 to 1936, Dr Goodkind made the observations included in this paper at the Harriet Lane Home, Baltimore, and the Massachusetts General Hospital. Dr Goodkind died on September 3, 1937, he had collected the data, but had not recorded an interpretation of the results. The tabulation, the conclusions and the preparation of the paper were completed by Dr Higgins

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Observations have been made on 23 patients (13 from the Harriet Lane Home and 10 from the Children's Metabolism Clinic of the Massachusetts General Hospital) who had been under sustained treatment for thyroid deficiency—cretinism—for a period of five and a half to twenty four years.

The purpose of this study was to assemble data bearing on the ultimate prognosis of this group of patients with regard to mental capacity, especially as correlated with the age at the time of diagnosis and beginning of treatment, with the maintenance

Physical growth is indicated by height, which is recorded as "normal" when it was normal for age and family size, and as "under normal," when it was definitely subnormal.

The maintenance dose of thyroid is that which the patient was receiving at the time this series of observations was begun. It is recorded as desiccated thyroid gland USP (Armour or Parke, Davis), where Burroughs and Wellcome thyroid had been taken, 1 grain is calculated as equivalent to $\frac{1}{4}$ grain USP.

TABLE I

CASE	AGE	SEX	I Q	AGE WHEN TREATMENT BEGAN	HEIGHT	DAILY DOSE OF THYROID	COLISE WITHOUT THYROID					
							BASAL METABOLIC RATE			BLOOD CHOLESTEROL LEVEL		
							0 wk	4 wk	8 wk	0 wk	4 wk	8 wk
	yr			yr		gr	%	%	%	g/100 cc	mg/100 cc	mg/100 cc
1 M	25	M	112	1	Normal	$\frac{1}{4}$	+5	-25	-2 *	152	220	310*
2 H	18	M	112	2 9/12	Normal	2	+25			15		
3 H	16	M	108	3	Under normal	1	-10	-14	-13	147	147	24
4 M	9	M	105	2 1/2	Normal	1	-1	-19	-33	15	356	480
5 H	17	F	95	2 6/12	Under normal	$\frac{1}{4}$	-8	-14		14	193	
6 M	16	M	90	7	Normal	$\frac{1}{2}$	+4	-23	-25	154	210	41
7 M	14	F	87	10/12	Under normal	$\frac{3}{4}$	1	-18	-25	167	305	309
8 H	21	F	86	2	Normal	$\frac{1}{4}$	-5	13		115	227	
9 M	17	F	85	2 6/12	Normal	$\frac{1}{2}$	+5	-8	-25	18	305	30
10 M	8	F	78	1 7/12	Under normal	$\frac{1}{8}$	+	-4	7	163	20	273
11 H	24	M	76	4	Normal	3	+17	+3	-70	110	183	
12 H	10	M	72	3	Under normal	1				114	208	
13 H	17 1/2	F	69	3 6/12	Under normal	3	+19	-14		58	332	
14 H	12	F	67	6/12	Under normal	$\frac{1}{4}$	+12	-13		191	312	
15 H	19	F	65	8/12	Under normal	1	-10	-17		185	478	
16 M	19	F	65	5 6/12	Under normal	1	+18	-14	-31	156	305	367
17 H	19	M	64	2	Normal	1	+1	+7†	+5†	—	143†	100†
18 M	17 1/2	F	63	5 6/12	Normal	$\frac{1}{4}$	8-7	-23	-21	1181	301	357
19 H	18	F	50	10/12	Normal	3		-2	-25	80	144	518
20 H	15	M	42	4/12	Under normal	$\frac{1}{2}$	-16	-30		183		
21 H	19	M	42	4/12	Under normal	$\frac{1}{2}$	+8	-12	-17	56	437	550
22 H	14	F	20	8/12	Under normal	1	+9	-11	-16	157	351	416
23 H	11	F	15	2 6/12	Normal	2	-2			148	375	848

*After being without thyroid for 6 mo. basal metabolic rate -27 per cent. blood cholesterol level 242 mg. per 100 cc.

†5 x mo.

‡Seven mo.

§After being without thyroid for 12 wk. basal metabolic rate -29 per cent. blood cholesterol level 355 mg. per 100 cc. After 16 wk. -41 per cent. and 305 mg.

dose of thyroid (degree of functional deficiency of the patients' own thyroid glands), and with the presence or absence of normal growth. The therapy of many patients was omitted for eight weeks, basal metabolism and blood cholesterol determinations were made before and four and eight weeks after the medication was discontinued.

In selecting the patients, availability for study was the main criterion.

The results are recorded in Table I. Patients marked 'H' were seen at the Harriet Lane Home, those marked 'M' at the Massachusetts General Hospital.

The patients are listed in six groups according to their intelligence quotients, which were determined by Binet-Simon tests, fourteen years being regarded as the adult level. Thyroid therapy was being given at the time of the tests.

Basal metabolism and blood-cholesterol determinations were made at the time the patient was receiving the usual dose of thyroid and four and eight weeks after treatment had been discontinued. The few cases in which the data cover longer periods are indicated by footnotes.

The age at which diagnosis was made and treatment begun is given in years. The diagnosis was made before the patient was one year old in 9 cases, and under two years in another case. Analysis of these histories indicates congenital thyroid deficiency (cretinism).

The diagnosis in the other 13 cases was made later, the patients being two years of age or over. One of these patients, Case 23, showed symptoms of hypothyroidism at six months of age, the diagnosis was not made and treatment was not begun until two years later (congenital hypothyroidism).

with delayed treatment). Another patient (Case 6) was apparently normal—walking and saying words—at sixteen months of age; he had his first teeth at nine months. His symptoms began at four years of age, when growth stopped and lassitude and myxedema appeared; this patient had acquired myxedema and was not a congenital cretin.

The classification of the other eleven cases is more difficult. They are Cases 2, 3, 5, 8, 9, 11, 12, 13, 16, 17 and 18, and were recognized as cases of hypothyroidism relatively late. It is certain that the symptoms were not marked in the first year and a half of life; but there is information in the histories of each that makes one believe that the patients were then below par mentally and physically; as for instance delayed dentition or failure to stand, walk or say words at the normal age. An analysis shows that some congenital deficiency existed, but also that some thyroid function may have been present that later was lost.

Whether one is dealing at birth with true athyreosis, with partial thyroid deficiency or with normal thyroid function with loss of some or all function within the first two years of life, is always difficult to determine.

This differentiation of complete cretinism, partial cretinism, infantile myxedema and juvenile myxedema is hard to make because hypothyroidism has a gradual and insidious onset, because maternal hormone, absorbed by the child in utero, affords protection from symptoms for a considerable time, because minor amounts of hormone may be obtained from milk and food, because the patient himself cannot give a history pertinent to the diagnosis, and because wishful thinking on the part of many parents obscures deficiencies in their infants. Therefore, it has seemed best to group all the cases in one table.

Six patients showed a normal intelligence quotient, four being above 100. This does not agree with the usual impression that normal mentality in a cretin is never found. However, 6 patients were of low normal intelligence, and 11 were retarded. The mean mental level is marked by an intelligence quotient of 72.

Clinically, some cretins reach normal physical development under treatment, whereas others remain dwarfed to a greater or less degree. Of our group, 12 were definitely under normal height. The mean intelligence quotient of those of normal height was 85, and of the dwarfed group 68. Although the mental level tended to be higher in patients of normal height, in several cases of normal mentality the physical response to glandular therapy was subnormal.

Experience at the Children's Metabolism Clinic of the Massachusetts General Hospital has in-

dicated that the daily dose of thyroid U.S.P. (Armour) necessary to maintain normal metabolic function in completely athyreotic children is $\frac{1}{4}$ gr. per year of life up to six years of age; $1\frac{1}{2}$ gr. is sufficient for older children and adults.⁶ In practice, however, the daily dose is based on the clinical reaction as well as on the basal metabolism of the individual patient; some patients do better with larger doses, and others, especially the mentally retarded, do not react well socially on the dose necessary for maintenance of normal basal metabolism, and should accordingly receive less.

Examination of the data from the patients in our study seems to confirm the general thesis that the $1\frac{1}{2}$ -gr. dose for athyreotic patients is sufficient to maintain normal metabolism, and also a normal blood-cholesterol level. Only Cases 18, 20 and possibly 23 indicated a slightly higher need for thyroid; on the other hand, Cases 2, 11, 13 and 19 were receiving larger doses than $1\frac{1}{2}$ gr., but also had high metabolism or hypocholesterolemia or both.

Of the 6 patients with normal intelligence, 3 required full dosage of thyroid (Cases 1, 2 and 6), and 1 probably full dosage (Case 3), whereas 2 did not require full dosage for normal metabolism (Cases 4 and 5). In the group with low normal intelligence, full dosage was required in 2 (Cases 9 and 11), probably full dosage in 1 (Case 8), and less than normal dosage in 3 (Cases 7, 10 and 12). The respective figures for the retarded group were 7 (Cases 13, 15, 18, 19, 20, 21 and 23), 0, and 4 (Cases 14, 16, 17 and 22). Thus the percentages of complete athyreotic patients in each group were essentially the same: 66, 50 and 64.

The conclusion seems justified that the dosage of thyroid needed to obtain normal metabolism was not a factor in the ultimate mental capacity of the patient when under treatment.

Of the 11 cretins diagnosed and treated early, 6 received full dosages of thyroid and 5 did not require full dosage. Of the 12 cases diagnosed later, 6 required full dosage, 2 probably full dosage, and 4 only part dosage. The time of diagnosis and beginning of treatment did not determine the dosage needed later.

The age at which diagnosis was made and treatment started was also by no means the deciding factor in the ultimate mental capacity. In fact, the cases diagnosed as cretins and receiving first treatment early tended to be in the mentally retarded group; whereas only 2 cases among the patients with normal mentality were diagnosed before one year of age, there were 6 among the mentally retarded group. The diagnosis in Case 4 was made early because an older sibling had been a cretin.

Interpretation of these findings is difficult be-

cause we doubtless are dealing with different degrees of early thyroid function. Certainly mental retardation, if present, may lead to earlier recognition by parents and the physician that the child is abnormal.

Since the physical dwarfism, the maintenance dose of thyroid, and the age when treatment began are not clear-cut factors causing mental incapacity in hypothyroidism of children, the mental retarda-

elsewhere and placed on thyroid therapy; later, the question of whether the diagnosis was correct arises, and withdrawal of therapy is usually the only sure way to establish the diagnosis.

In 22 of our 23 patients, this was done; in 21, determinations of basal metabolism or blood cholesterol or both were made after four weeks and again after eight weeks, and in 2 cases also at longer intervals. In most of the patients, the lab-

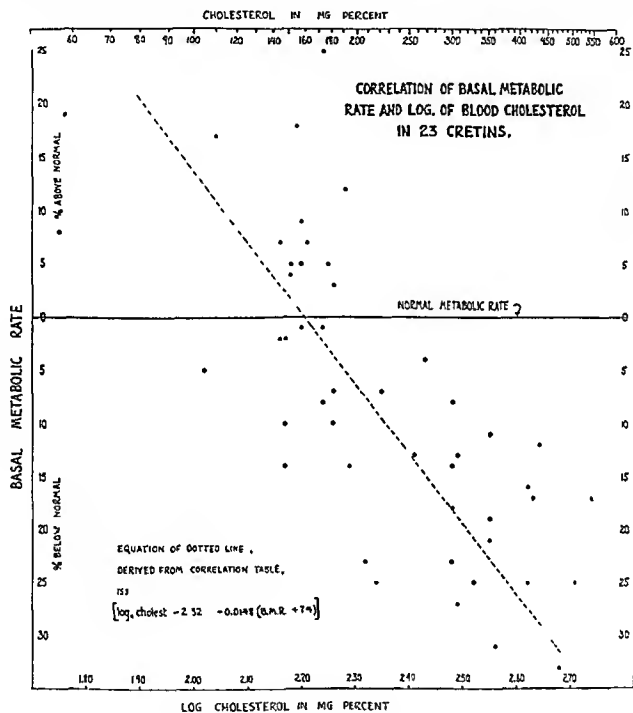


FIGURE 1.

tion may quite well have the same etiologic cause as the athyria in certain cases, and the athyria may not be the cause of the mental retardation. The athyria would thus be looked on as causing mental slowing and not mental incapacity.

It has been the practice at the Massachusetts General Hospital to photograph each untreated cretin; this is a valuable procedure, since the signs and symptoms of cretinism disappear within a few weeks after treatment with thyroid is begun; a later review of the case for diagnosis is thus made more satisfactory. It frequently happens that a patient has been diagnosed as hypothyroid

oratory tests as well as clinical observations had proved the diagnosis of hypothyroidism after four weeks, and in all after eight weeks. One patient (Case 17) was apparently no longer suffering from hypothyroidism at the time of the study; after seven months without thyroid therapy the basal metabolism and blood cholesterol level were normal, although three years previously the metabolism had dropped from +10 to -21 per cent after fifty six days' withdrawal of therapy. This patient offers an exception to the statement, "Once a cretin, always a cretin."

The blood cholesterol level as an index of the

state of thyroid sufficiency has been quite well established both for hyperthyroidism and hypothyroidism. Hurxthal⁷ found that the hypercholesterolemia of hypothyroidism is marked and consistent and concluded that in the absence of a few other common causes, it indicated thyroid deficiency more specifically than the finding of a low basal metabolic rate.

Having at hand fifty-six parallel determinations of the blood-cholesterol level and the basal metabolism of cretins aged eight to twenty-five years, both when receiving and not receiving thyroid, we considered it desirable to try to correlate these findings. This has been done in Figure 1.

The correlation of the logarithm of the blood cholesterol value, in milligrams per cent, with the basal metabolic rate, in terms of percentage deviation from normal, shows that a significant relation exists and that the equation,

$$\text{Log. (cholesterol)} - 2.32 = -0.0148 (\text{B.M.R.} + 7.4),$$

will allow the prediction of the cholesterol with an error of about 17 per cent, or .07 in terms of logarithms.*

Analysis of our data confirms the findings that cholesterol determinations of the blood serum or plasma are a good index of the degree of hypothyroidism and correlate well with the metabolic rate determinations. The method of choice in evaluating treatment apparently depends on the availability and ease of the two laboratory procedures. The low cholesterol findings before treatment in Cases 13 and 19 suggest that 3 gr. of thyroid was too big a dose; the findings in Cases 11 and 21 are similarly suggestive.

SUMMARY

Observations were made on 23 hypothyroid patients under treatment from five and a half to twenty-four years, all but one, so far as can be ascertained, being not wholly normal during the first year of life, and therefore probably congenital cretins.

*We are indebted to Professor E. B. Wilson, of the Harvard School of Public Health, for this statistical analysis.

Six showed intelligence quotients between 90 and 112, 6 between 70 and 89, and 10 below 70.

Although the mean intelligence quotient was higher in the patients of normal physical growth than in the dwarfed, 2 of the dwarfed group had normal intelligence and many of normal size were mentally retarded.

The age of diagnosis and beginning of treatment was usually earlier in the ultimately mentally retarded cases than in those of normal intelligence.

The criterion that $1\frac{1}{2}$ gr. of thyroid U.S.P. daily will raise to normal the basal metabolism of the athyreotic patient over six years of age was confirmed.

The degree of thyroid deficiency, as measured by the amount of thyroid necessary to maintain normal metabolism, was not proportional to the degree of mental retardation.

The cholesterol content in blood serum or plasma showed close correlation with the basal metabolic rate.

Since the ultimate mental capacity of the hypothyroid child under adequate treatment was not strictly related to physical growth, to delay in beginning treatment or to the dose of thyroid necessary for normal metabolism, the cerebral deficiency can probably be regarded as congenital and from the same cause as the thyroid damage.

Determinations of the basal metabolic rate and the blood-cholesterol level following the withdrawal of thyroid therapy are of diagnostic significance in the doubtful cases of treated cretinism.

REFERENCES

1. Lucas, W. P. *The Modern Practice of Pediatrics*. 962 pp. New York: Macmillan Co., 1927.
2. Wicland, E. *Pathology of the thyroid gland* von Pfandl and Schlossmann's *The Diseases of Children*. Fourth edition. Vol. II. 512 pp. Philadelphia: J. B. Lippincott Co., 1935. Pp. 278-321.
3. Fordyce, A. D. *Diseases of the endocrine glands* Parsons and Barling's *Diseases of Infancy and Childhood*. Vol. 1. 876 pp. London: Oxford University Press, 1933. Pp. 666-679.
4. Holt, L. E., Jr. and McIntosh, R. *Holt's Diseases of Infancy and Childhood*. Tenth edition. 1240 pp. New York: D. Appleton Century Co., 1936.
5. Rolleston, H. Prognosis in cretinism. *Lancet* 2:372, 1934.
6. Higgins, H. L. Two cases of dwarfism. *New Eng J Med* 214:145-150, 1936.
7. Hurxthal, L. M. Blood cholesterol and thyroid disease. III. Myxedema and hypercholesteremia. *Arch Int Med* 53:762-781, 1934.

ACUTE LARYNGEAL OBSTRUCTION AS A COMPLICATION OF MEASLES

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ACU TE laryngeal obstruction is a rare but serious complication of measles. Very few textbooks on the subject of pediatrics and communicable diseases mention this sequela, and a perusal of the literature reveals that little consideration is given to it.

Morse,¹ Barnhill,² Coakley³ and Scheppegegrell⁴ mention this complication in the discussion of measles, but they do so in a cursory manner, and say little or nothing concerning its management.

Homrighouse and McKee⁵ cite a case of a twenty-one-month-old boy who developed obstructive laryngeal symptoms on the tenth day of measles. The boy was anesthetized for the purpose of bronchoscopy, but died suddenly while under anesthesia.

Oliver and Turner⁶ described 3 cases of laryngeal obstruction that occurred during an epidemic of measles in Beirut, Syria, in 1933. Obstructive symptoms in all 3 cases developed during the height of the rash; all were treated by tracheotomy. Two of the children survived.

Neffson and Wishik⁷ discuss this subject in their classic paper on acute infectious croup. Their findings are most interesting because they present the largest series of cases—35 patients. Statistically, the condition of acute laryngeal obstruction occurred in less than 1 per cent of the total number of cases of measles (3677) admitted to the Willard Parker Hospital from June, 1931, to June, 1934. Contrary to most opinions, acute laryngeal obstruction can occur at any stage of measles—in the pre-eruptive, eruptive or post-eruptive stage. Pathologically, these cases showed the edema to be located chiefly in the supraglottic area, and usually present to a marked degree. Laryngeal cultures showed *Staphylococcus aureus* or *Streptococcus haemolyticus* as the offending agent in about equal proportions. About 50 per cent of the cases went on to develop pneumonia as a further complication.

In the experience of the authors mentioned above, treatment by intubation was not the method of choice, for in their hands 6 of the 7 patients treated by intubation died.

It is obvious, of course, that, for the relief of laryngeal obstruction, intubation is a far better procedure than tracheotomy from the point of

view of final result and comfort of the patient. If properly done and if the patient is carefully supervised while the tube is in the larynx, intubation causes fewer complications, is less devastating to the patient and esthetically is the procedure of choice.

The following 3 cases of acute laryngeal obstruction complicating measles have come to my attention in the last two years.

CASE REPORTS

CASE 1.[†] P. O. (No. 96619), a 2-year-old boy, sick for 4 days with measles, entered the South Department of the Boston City Hospital. For the few hours before entry he experienced rapid breathing, cyanosis and moderately deep suprasternal, substernal and intercostal retractions. The voice was hoarse, the breath sounds were somewhat diminished throughout, and there were many scattered moist rales in both lungs. The patient was placed in a croup tent and given steam inhalations, but his condition became progressively worse. He was laryngoscoped, a culture of the larynx was taken, and he was intubated by visual method that evening, a No. 1 tube being used. The culture showed a predominance of *Streptococcus haemolyticus*.

During the next 6 days he seemed comfortable with the tube in the larynx, but on the morning of the 7th day he coughed up the tube and his condition became immediately alarming. It was necessary to reintubate him within a few hours. This time a No. 2 was used. This was kept in place for 1 week. The patient improved markedly, and on the 7th day he was extubated by the visual method; he was discharged 2 days later in good physical condition, except for slight hoarseness.

CASE 2.[‡] W. O'C., a 4-year-old boy, was admitted to the Belmont Hospital, Worcester, Massachusetts, after a hurried 25-mile trip over the highway, in a precarious condition. He was markedly dyspneic and presented marked substernal retractions. There was a fading erythematous maculopapular rash, with marked injection of the conjunctivas, injection of the posterior pharynx and enlarged, boggy tonsils. Harsh breath sounds were heard in the upper part of the chest only. The larynx was not visualized, but on indirect intubation marked edema of the epiglottis was noted. A culture of the nose and throat showed *Staphylococcus aureus*. No laryngeal culture was attempted.

The patient was intubed immediately after admission by the indirect method, without apparent relief. He was therefore extubated, but the retractions became so severe that he was almost immediately reintubated, this time with good effect. He spontaneously extubated during the night of admission, and was again reintubed. During the next 4 days the patient's condition continued to improve. On the 5th day he again spontaneously extubated and had to be

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[†]By permission of Dr. Edwin H. Place, chief physician of the South Department, Boston City Hospital.

[‡]By permission of Dr. Elizabeth Bishop, resident physician, Belmont Hospital.

reintubed once more. On the following day, he again coughed up the tube, but his condition seemed so improved that reintubation was not considered necessary. Convalescence from then on was uneventful, and he was discharged on the 14th day with no abnormal physical findings other than a slight huskiness of the voice.

CASE 3. R. O'C., a 4-year-old boy and a brother of W. O'C. (Case 2), entered the isolation unit of the Burbank Hospital on the 2nd day of a measles rash, because of a sudden and progressive respiratory difficulty, a moderate degree of cyanosis and a marked hoarseness of voice. He was extremely restless, and breathing involved marked infra-sternal and suprasternal retractions. He was placed in a croup tent and given steam inhalations, but the degree of obstructive symptoms became more marked. A throat culture taken at this time revealed rare gram-positive diplococci, occasional *Staph. aureus* and a short-chained streptococcus; no *Corynebacterium diphtheriae* were seen.

Laryngoscopy showed considerable swelling of the subglottic and supraglottic areas. A No. 3 tube was inserted into the larynx, with prompt relief of symptoms. One hour later in an attack of spasmodic coughing the tube came out, and was reinserted by the visual method. He was again relieved of obstructive symptoms and went to sleep. About 6 hours later he coughed up the tube, and this time a No. 4 tube was inserted. This tube fitted rather snugly. He kept this tube in and improved rapidly from that time on. On the 3rd day his temperature fell to normal, and the patient was extubated by the visual method. The symptoms did not return, and he was discharged on the 5th day in good physical condition.

CLINICAL NOTE

A NOTE ON PAIN AND ITS REFERENCE IN CASES OF RENAL INFARCTION

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STIMULATED by a history of unusual reference of pain to the testicle as the result of renal infarction in Case 26231¹ of the "Case Records of the Massachusetts General Hospital," we have reviewed the symptomatology in one of the larger reported series of cases of infarct of the kidney proved at post-mortem examination, and in cases encountered at the Massachusetts General Hospital in the last seven years. In 1933, Barney and Mintz² reported an analysis of 143 cases of renal infarct from the autopsy records of the Massachusetts General Hospital. Of this series, 117, or 83 per cent, were on the medical wards. Almost all the patients on the medical services were found to have acute or chronic heart disease. Sixty-eight

SUMMARY

This paper calls attention to the infrequent but serious complication of acute laryngeal obstruction in measles. Three cases are presented that were treated by intubation. Characteristic of this type of management is the necessity for careful nursing supervision and frequent reintubation, but this is compensated for by the infrequent occurrence of complications and by the freedom from the danger of repeated blocking, which is always present when a tracheotomy tube is used. In addition, there is no scarring of the neck, a condition of benefit to the patient in later life.

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REFERENCES

1. Morse, J. L. *Clinical Pediatrics*. 848 pp. Philadelphia: W. B. Saunders Co., 1926.
2. Barnhill, J. F. *The Nose, Throat and Ear*. 604 pp. New York: D. Appleton & Co., 1928.
3. Coakley, C. G. *Manual of Diseases of the Nose and Throat*. Sixth edition. 664 pp. Philadelphia: Lea & Febiger, 1922.
4. Scheppegrell, W. *Diseases of the larynx*. Abt's *Pediatrics*, Vol. 3. 1051 pp. Philadelphia: W. B. Saunders Co., 1925. Pp. 791-803.
5. Homrighouse, S. L. and McKee, T. M. Fatal prodromal measles. *New York State J. Med.* 39:1934-1936, 1939.
6. Oliver, K. S. and Turner, E. L. Acute edema of the larynx complicating measles. *J. A. M. A.* 101:1801, 1933.
7. Neffson, A. H. and Wishik, S. M. Acute infectious croup. I. Diphtheritic croup. *J. Pediat.* 5:433-474, 1934. II. Acute nonspecific infectious croup. *Ibid.* 5:617-641, 1934. III. Croup associated with specific diseases. *Ibid.* 5:776-793, 1934.

per cent of the cases were afebrile. Nausea and vomiting were rare, being noted in only a little over 8 per cent. In 88 cases, or 65 per cent, there was no pain or tenderness at any time. Among the cases with pain and tenderness, none were associated with costovertebral tenderness, which has so often been associated with renal disease. There was no mention of the symptom of typical renal colic in any case.

Among 75 cases of renal infarction that came to autopsy at the Massachusetts General Hospital during the seven years from January 1, 1933, to January 1, 1940, 20 patients gave histories of recent or fairly recent abdominal pain. However, most of the cases were eliminated because of the location of the pain and because of its association with other complicating abdominal conditions, such as cholecystitis, cholelithiasis, dissecting aneurysms of the abdominal aorta, renal carcinoma, nephrolithiasis and mesenteric thrombosis. There remained 3 patients with histories typical of renal colic—severe pain in the sides of the abdomen or flanks, costovertebral tenderness, nausea and vomiting—in whom no other intra-abdominal condition existed to account for the symptoms. In 2 of these cases, the pain radiated down to the lower quadrants of the abdomen, but in no case was there radiation of the pain to the genitalia.

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Other rare cases of renal colic and radiation of pain to the genitalia in renal infarction have been encountered, as noted by Aschner,³ who recorded 2 cases, by Falci,⁴ who cited 1 case (among 22 of renal infarction collected from the literature, in most of which there was flank or lumbar pain, with reference to the thigh in a few and with vomiting in a few), and by Loeb,⁵ who, in a discussion of diseases of the kidney, remarked that in renal infarction it was possible to have a clinical picture identical with that of renal colic.

It has been suggested by Ehrstrom⁶ that the pain in renal infarction is due to swelling of the kidney and consequent stretching of the capsule.

The pathogenesis of the striking renal colic in Case 26231, with unusual radiation of pain to the testicle, such as is characteristic of renal and ureteral calculus, can be adequately explained as the result of referred symptoms from the renal involvement alone, without the need of incriminating ureteral or bladder lesions. It is unlikely that a blood clot passing through the ureter would have caused the pain, because the pain came at once,

before the blood clot might have formed, and because there was very little actual blood in the urine.

It has been mentioned at times that the clinical picture of renal infarct can so simulate that of true renal colic that in rare cases such patients are operated on for the removal of the supposed stone. However, we were unable to find any such case in the autopsy and surgical pathological files of this hospital, and conversations with members of the urological staff failed to reveal any such case.

Thus, in renal infarction, pain is oftener absent than present, renal colic is very uncommon and radiation of pain to the genitalia is exceedingly rare.

REFERENCES

- 1 Case 26231 case records of the Massachusetts General Hospital. *New Eng J Med* 222:966-972, 1940.
- 2 Barney J O and Mintz E R. Infarcts of the kidney. *JAMA* 100:16, 1933.
- 3 Aschner P W. The clinical importance of acute infarction of the kidney. *Am J Med Sc* 164:386-401, 1972.
- 4 Falci E. Sur la necrose du rein. *J d urol* 18:449-465, 1924.
- 5 Loeb R F. Diseases of the kidney. *Nelson's Loose Leaf Med enc* Vol 4. New York: Thomas Nelson & Sons, 1938. P 631.
- 6 Ehrstrom R O. Klin. der Niereninfarkte und der Nierenvenenthrombose. *Acta med Scand nav* 83:458-484, 1934.

MEDICAL PROGRESS

HEMATOLOGY*

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INFECTIOUS MONONUCLEOSIS

SINCE cases formerly diagnosed as "grippe," influenza, septic sore throat, mesenteric adenitis, appendicitis, continued fever and so forth are being recognized as examples of infectious mononucleosis, the importance of this disease in general practice is gradually becoming more and more evident. That the disorder frequently, if not usually, goes unrecognized is by now a truism. If the practitioner were to examine carefully for enlarged lymph nodes and spleen in every case of fever, the percentage of recognized cases would be greatly increased. Too often, it seems, the throat, heart, lungs and abdomen are examined with very little attention to possible lymphadenopathy. If, furthermore, blood smears were made routinely, the disease would be recognized far more frequently. The blood picture is so characteristic, once it is known and recognized,

that it permits ready diagnosis. There is lymphocytosis (not monocytosis), the lymphocytes being of all possible sizes, shapes and staining characteristics. Great variability in the type of lymphocyte is the outstanding feature—quite the reverse of acute leukemia, in which a "monotonous" blood picture with one type of lymphocyte, usually the lymphoblast, predominates. There is furthermore no anemia, and hardly ever any reduction in blood platelets—again quite in contrast to acute leukemia, in which rapidly progressive anemia and thrombocytopenia are the rule. The introduction of the heterophil agglutination test has been of material aid in further defining these cases, which usually give a positive agglutination reaction with sheep's red blood cells.

There is almost no limit to the bizarre manifestations of the disease. As in all generalized conditions (polycythemia, metabolic disorders and so forth) peculiar localizations occasionally crop up. Jaundice, which looks typically like the catarrhal type, may be the presenting symptom. A case of this type, associated with a positive Wassermann

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mann reaction, is reported by Fowler and Tidrick.¹ As these authors point out, "it is not improbable that many cases diagnosed as catarrhal jaundice have actually been infectious mononucleosis." Positive serologic tests for syphilis not infrequently occur concurrently with the positive heterophil reaction. Bernstein,² who gives a comprehensive review of the disease, found a transiently positive Wassermann reaction lasting for two or three weeks in 8 of 44 cases. On the other hand, Davidsohn,³ of Chicago, who has been responsible for some of the outstanding work with the heterophil reaction, has failed to find one case with positive serologic tests for syphilis in his carefully studied series. At any rate, changes in the serum may cause agglutination of sheep's red cells and positive Wassermann, Kahn and Hinton reactions. These changes are apparently not the result of the same serologic abnormality, but their mechanism is at present unknown.

Bernstein, in his review, cites such symptoms as edema of the eyelids, skin eruptions, and central-nervous-system manifestations, which are occasionally present. Templeton and Sutherland⁴ point out the frequency of an exanthem in the disease—17 of 91 cases. In 12 cases, the rash was practically indistinguishable from that of German measles. In this connection, it should be noted that the latter disease is associated with well-marked lymphadenopathy and not infrequently with an abnormal lymphocytic reaction in the blood; one wonders whether they might be related.

The etiology of the disease and the manner of its spread remain obscure. Epidemics are occasionally seen, but even in these, the type of spread has not been worked out. The pathology of the disorder has naturally not been extensively studied because of the absence of autopsied material. However, biopsied lymph nodes have resulted in an understanding of the fundamental nature of the lymphocytic proliferation. Gall and Stout,⁵ on the basis of ten biopsied lymph nodes, claim that there is a specific pathologic picture. This is characterized by marked proliferative activity of the pulp, extensive but focal proliferative activity of clasmacytes and the appearance of large numbers of specific so-called "infectious mononucleosis cells." These are large lymphocytes with abundant basophilic cytoplasm, which with phloxin and methylene blue stains have a filmy-blue quality of the cytoplasm.

The prognosis is always good. There is no specific therapy for the disease, which indeed usually requires only symptomatic treatment. The sulfonamide drugs are of no value unless there is a secondary infection with streptococci or pneumococci. Occasionally there is a rather marked, as-

sociated Vincent's infection, which may cause a severe cervical adenitis. If this is present, an injection of 0.3 gm. of neoarsphenamine intravenously may be of great benefit.

REACTIONS OF THE BLOOD TO DRUGS

The reactions of the blood cells to the sulfonamide group of drugs continue to be the subject of much comment. These drugs have an effect on hemoglobin that is usually slow but may occasionally be rapid (acute hemolytic anemia). In the slow type of response, methemoglobin and sulfhemoglobin, which are inactive pigments, are slowly formed, and are probably responsible, at least in part, for the cyanosis commonly noted. Earlier conflicting results regarding the presence or absence of these pigments have been resolved by greater accuracy of methods. Smith,⁶ experimenting with white rats, found that sulfanilamide given orally for a month caused small but significant amounts of methemoglobin and somewhat larger amounts of sulfhemoglobin. There was a definite reduction in hemoglobin. These results are borne out in human observations by Harris and Michel.⁷ The degree of methemoglobinemia was proportional to the sulfanilamide concentration. Vigness, Watson and Spink⁸ found that the cyanosis of sulfanilamide therapy could be explained by the presence of methemoglobin, rarely sulfhemoglobin, and that methylene blue abolished the cyanosis as well as the abnormality of hemoglobin pigment. Erf and MacLeod⁹ noted an increase in fecal urobilinogen output (increased blood breakdown) in cases of pneumonia treated with sulfapyridine. Three of 8 cases so treated developed a definite hemolytic anemia. Paul and Limarzi¹⁰ found that the bone marrow became more hyperplastic after sulfanilamide administration, again indicating a hemolytic effect. Spence and Roberts¹¹ report a case of extreme leukocytosis and acute hemolytic anemia with sulfanilamide administration. They point out that leukocytosis may be an early hidden manifestation of a hemolytic process associated with administration of the drug.

The subject of acetanilide poisoning has received scant attention in comparison with that of the toxic reactions of the sulfonamide drugs. However, Meulengracht and his collaborators¹² have very properly revived interest in the matter, especially since drugs such as Bromo-Seltzer are so commonly used in this country. As with sulfanilamide, acetanilide rapidly produces cyanosis, which for years has been thought to be due to methemoglobin or sulfhemoglobin. These authors found that the cyanosis was caused by the decomposition of acetanilide to dark-colored derivatives of

para amidophenol. Since continuous use of the drug is followed by "a peculiar and gray addiction" with persistent fatigue and headache, the authors recommend that prescriptions for the drug should not be refilled. In this country more stringent regulations might well be made.

IRON-DEFICIENCY ANEMIA (HYPOCHROMIC ANEMIA)

Chronic iron-deficiency anemia is usually the end result of a group of etiologic factors: a diet inadequate in iron, achlorhydria, malabsorption of iron-containing material from the bowel, hemorrhage (menorrhagia and hemorrhoids), multiple pregnancies and so forth. One factor alone is rarely at fault in these cases, although achlorhydria may be the crux of the problem. Thus cases with such abnormalities as impaired dietary and menorrhagia might develop very little anemia unless the gastric juice were also affected.

Iron-deficiency anemia in children is discussed by Abbott and Ahmann,¹³ who studied a group of 883 rural school children in Florida. Half of them were anemic (below 70 per cent hemoglobin, Dare), and a hemoglobin between 70 and 85 per cent was found in nearly one third. A number of children had been born of anemic mothers and had probably been anemic to some extent for the greater part of their lives. Pallor, general muscular weakness, lassitude and a faint systolic murmur were commonly present when the hemoglobin level was below 50 per cent. As etiologic factors are listed poverty, food high in carbohydrate, hookworm infestation and various gastrointestinal disturbances. It is also possible that certain infants born in families with either pernicious anemia or chronic hypochromic anemia may have a constitutionally defective gastric mucosa, which might result in failure adequately to digest organic iron-containing foods.

By the use of radioactive (so called "tagged") iron, Hahn and his co-workers¹⁴ at the University of Rochester have been actively engaged in the study of iron metabolism. In animals, it is possible to study the labeled iron from the time it enters the circulation until it is excreted. Its incorporation in the hemoglobin molecule has also been studied.¹⁵ In the dog with chronic iron deficiency, iron is rapidly taken up in the red blood cells, and the body cells are apparently avid for it, whereas the normal animal to a great extent rejects iron.

In the patient who has had a hemorrhage, as from a peptic ulcer, it has long been debated whether added iron was of value. Lyons and Brenner¹⁶ contribute to this discussion by an analysis of 237 cases of bleeding peptic ulcer. The rate

of erythropoiesis following hemorrhage appeared strictly dependent on the degree of anemia, and was "fully as good as that reported for patients treated with a liberal, 'purged diet' and iron." Transfusion itself appeared to have no effect on the rate of red cell production.

In pregnancy, the incidence of anemia is quite high, amounting, Bethell, Gardiner and MacKinnon¹⁷ state, to 54 per cent of 158 cases studied. The majority of these cases were of the iron-deficiency type. Since normal gestation places no great demand on maternal iron stores, the anemia was due mostly to other factors: low iron reserves, restricted utilization of reserve iron, impaired absorption of iron during gestation and low dietary intake of iron. It should be noted that poverty and an inadequate intake of food iron frequently go together, since the foods containing large amounts of iron are for the most part the most expensive (meat, liver, green vegetables and eggs). If inorganic ferrous preparations are given in cases of hypochromic anemia, there is an excellent response; the routine use of iron during pregnancy is thus a justifiable procedure.

In males, chronic hypochromic anemia is almost always due to persistent bleeding, particularly from the gastrointestinal tract. Given a case of apparently idiopathic hypochromic anemia in a male, the stools should be searched for occult blood, and gastrointestinal studies should be instituted. Not infrequently, herniation of the stomach is discovered. A number of such cases have been reported in recent years. Two have recently been reported by Dyke and Dyas.¹⁸ In the second case, occult blood in the feces was present, although the test was negative in the first case. A negative finding for occult blood does not necessarily rule out the possibility that the anemia is associated with the hernia, since persistent bleeding in the past may well have taken place.

Recently, the possibility that some types of vitamin deficiency might be linked with hypochromic, microcytic anemia has been discussed. Thus, in dogs, a deficiency in the "rat antidermatitis principle"—vitamin B₆ or pyridoxin—has been shown by Fouts, Helmer and Lepkovsky¹⁹ to result in hypochromic anemia, responding to pyridoxin administration. This has been confirmed by Borson and Mettier.²⁰ Whether these experimental observations have any relation to the hypochromic anemia of human beings is questionable.

Chlorosis which is usually considered as practically extinct, is probably far commoner than is generally appreciated. It is likely that many diagnoses of chlorosis prior to 1900 were made without benefit of careful laboratory examinations, and it is therefore possible that many cases of such con-

ditions as pulmonary tuberculosis, chronic hemorrhage and even neurasthenia were diagnosed as chlorosis. In taking histories in adult women with chronic iron-deficiency states associated with achlorhydria, it is noteworthy that the great majority have been "anemic for years" or "anemic since childhood" or were "treated with iron twenty years ago." In all probability, many of the cases of chronic idiopathic or primary hypochromic anemia of late adult life have been examples of "chlorosis" in youth. The central feature of both these disorders is probably the histamine achlorhydria, which may indeed be indicative of a constitutional gastric atrophy. It is possible that this abnormality may lead to certain cases of so-called "nutritional anemia" in infancy, to chlorosis in puberty, and to primary or idiopathic hypochromic anemia of late adult life. Certain cases may furthermore develop pernicious anemia as a late manifestation. The marked reduction in hemoglobin that ensues with chronic iron deficiency results in a disappearance of the normal healthy red color from the skin, with the result that the basic yellowish color of the skin becomes quite obvious. Owing to a common tendency in medicine to exaggerate colors, the yellowish coloration has been termed "green," possibly because greenish overtones may be seen by the more artistic observers. Thus, the so-called "green-sickness" or chlorosis is in all probability simply a chronic iron-deficiency state of young people, usually young women, and usually with an atrophied gastric mucosa. In my series, and in that of Olef,²¹ complete histamine achlorhydria was usually present. Response to inorganic iron is rapid, but relapses occur when the medication is discontinued, so that a maintenance dose is recommended.

PERNICIOUS ANEMIA

Pernicious anemia is a deficiency disease. As such, it may result from an inadequate diet, a lack of digestion of protein by an atrophied gastric mucosa, which fails to produce "intrinsic factor," malabsorption by the bowel, or hepatic disease (inadequate storage), or in pregnancy it may follow the loss of liver-extract substance to the fetus. More recently, the possibility of lack of utilization of liver-extract factor by the body (so-called "achrestic anemia") has been postulated. It should be noted that in a given case, a number of etiologic factors may operate together. Thus, both the diet and the intrinsic factor may be grossly deficient; if only one were deficient, the patient might not develop the deficiency state. Multiple factors are thus important, and it should also be noted that the resulting changes in the body are also multiple. Pernicious anemia is not only

an anemia; it is a generalized disturbance—a starvation of the body for liver-extract substance with the result that graying of the hair, glossitis, gastrointestinal manifestations and central-nervous-system disturbances result. The anemia is simply one aspect of the deficiency, resulting specifically from lack of liver-extract substance by the bone-marrow cells.

The constitutional nature of pernicious anemia is discussed in an article by Schemm,²² in which 5 authenticated cases in the same generation of one family were studied. In addition, 2 cases in each of five families were observed. It is probable that all the hereditary cases are based on an inherited gastric (or gastrointestinal) mucosal atrophy with resultant diminution or even complete lack of intrinsic factor. Schindler, Kirsner and Palmer²³ discuss gastroscopic observations in the disease. Histologically, atrophic gastritis is chiefly characterized by extreme thinness of the gastric mucosa due to disappearance of the gastric glands. Schindler and his co-workers believe that the various changes are the end result of chronic inflammation, although most observers believe they are degenerative. A certain parallelism between changes in the tongue, the mucosa of the stomach and the spinal cord is usually present, although occasionally the gastric mucosa may be atrophied without changes of these organs.

Achrestic (lack of utilization) anemia has been described for the third time by Israëls and Wilkinson.²⁴ In their first papers, these cases of apparently typical pernicious anemia presented two unusual features: free hydrochloric acid in the gastric juice and failure to respond to liver-extract therapy. Because potent liver-extract principle was present in the livers of some of these autopsied patients, it was postulated that this material could not be utilized by the body. In the most recent paper, the authors' concepts have apparently undergone some modification, for of the 6 cases reported the only abnormality was the presence of free hydrochloric acid in the gastric juice. A definite response, perhaps somewhat slower than usual, occurred in all cases following the use of liver or gastric extracts. The matter of intrinsic factor in the gastric juice was not studied, although it appears (according to Castle's well-known experiments) that this is of greater fundamental importance than the presence of free hydrochloric acid. I recently observed a case similar to those reported by Israëls and Wilkinson, since the two uncommon features noted by them were present, in addition to the ordinary characteristics of pernicious anemia. Only when large doses of Ventriculin were given did the patient begin rapidly to improve.

Sprue is probably another subtype of the larger pernicious anemia syndrome. Castle and his co-workers²⁵ considered that the two diseases were identical, and it cannot be doubted that histologically and hematologically they often cannot be differentiated. Rodriguez-Molina²⁶ found that although the bone-marrow and hematologic aspects of sprue were identical with pernicious anemia, other features served for differentiation. Thus extremely bulky stools rich in fat, a low blood calcium, an increased sugar tolerance and a low rather than a high fecal urobilinogen output are characteristic of sprue and not of pernicious anemia. It is probable, however, that these are special symptoms perhaps representing, as stated above, a subtype of the larger syndrome. The matter of the fecal urobilinogen output is receiving increasing attention. It is the most sensitive method for determining the degree of blood destruction. In pernicious anemia, an increased output in the feces is always present. In sprue, as pointed out by Koller,²⁷ the output, as measured in 3 cases, was less than normal.

The duration of the remission in pernicious anemia has recently been studied by Strauss and Pohle.²⁸ The following conclusions are drawn: patients with pernicious anemia who require relatively little liver extract to maintain a normal blood level may relapse in as short a time as two months after liver therapy is omitted; the majority of patients with pernicious anemia cannot be satisfactorily treated by the use of massive doses of liver extract given at intervals of several months; and the optimum interval between injections for most patients is from one to four weeks. Another paper by the same group²⁹ dealing with therapy discussed combined degeneration of the spinal cord, with the results of seven years' experience with parenteral liver therapy. It was found that the neural lesions could be arrested in every case. If adequately treated, no case of pernicious anemia developed new neurologic disturbances. Adequate therapy should maintain the blood at a red-cell level of 4,500,000 or over, the color index at 1.0 or below and the mean corpuscular volume at 100 cu. microns or below; there must be no symptoms of any nature (glossitis, indigestion and so forth) attributable to pernicious anemia; and if there is recurrence of paresthesias or other subjective disturbances, the dose of liver extract must be doubled. Each patient's dosage is an individual matter. The material used by Strauss and his co-workers was a very dilute liver extract (1 unit per cubic centimeter), usually given in 10-cc. amounts weekly, although some patients required the material

three times weekly. In my experience, the highly concentrated extracts are as effective as the dilute extracts, perhaps more so, in treating the neurologic lesions, and they are much preferred by the patient.

HEMOLYTIC ANEMIAS

Interest in this group of cases, which is characterized by increased blood destruction, has developed considerably in the last few years. The hemolytic anemias have been classified as follows³⁰:

- A. Congenital hemolytic icterus (anemia)
 1. Chronic, with or without crisis
 2. Subacute
 3. Acute (crisis)
- B. Acquired hemolytic icterus (anemia)
 1. Secondary to known cause (infectious, chemical, "toxic," pregnancy and so forth)
 2. Symptomatic, in association with certain, usually malignant diseases, as lymphatic leukemia, Hodgkin's disease, carcinomatosis
 3. Of unknown cause, with or without hemolysins in the serum
 - a. Chronic, with or without crisis
 - b. Subacute
 - c. Acute
 - d. Acute fulminating, often with hemoglobinuria

This classification attempts to restore the former well-known grouping of congenital and acquired types, especially since there appears to be an unfortunate tendency to deny the existence of the acquired type.

Spherocytosis. The conception of the spherocyte is important in considering the hemolytic syndromes. About twenty years ago, Naegeli³¹ pointed out that the red cells in congenital hemolytic jaundice tended on the whole to be smaller, rounder and thicker than normal, and he designated them "spherocytes." He believed that the disorder represented an abnormal production of cells in a faulty bone marrow, and that the spherocyte was the pathognomonic cell of the hereditary disease. This statement was universally accepted. In recent years, Haden³² and others found that there was a direct correlation between the degree of thickness of the erythrocyte and its fragility to hypotonic solutions of sodium chloride. More recently, Dameshek and Schwartz³³ found hemolysins in the serum of 2 cases of acutely developing hemolytic anemia, in one of which marked spherocytosis was present. As the patient recovered after splenectomy, the hemolysin was no longer present, the spherocytosis gradually diminished and disappeared, and the saline fragility became nor-

mal. It was reasoned that perhaps the hemolysin and the spherocytosis were related. A hemolytic serum was therefore produced, which, when injected in guinea pigs, resulted in acute or subacute hemolytic anemia, spherocytosis, increased fragility and reticulocytosis. The degree of spherocytosis and anemia varied directly with the amount of hemolytic serum injected. Except for hyperplasia, the bone marrow was normal. These observations have recently been confirmed by Tigertt and Duncan³⁴ in dogs. Thus for the first time it was shown that spherocytosis could be produced without postulating an abnormal bone marrow. Spherocytosis in these experiments was shown to be the end-result of the activity of hemolysin, and the possibility was broached that a spherocyte represented a red cell that had already been damaged by a hemolytic agent. It seems likely that the spherocyte is the forerunner of complete hemolysis. It can be produced by immune hemolytic serums, by various chemicals, such as sulfanilamide, by hypotonic salt solutions and, in fact, by many agents that damage the red cell by various means. Although spherocytes of various conditions are morphologically indistinguishable, they may be quite different from the chemical or physical standpoints.

Mechanism. Although the presence of hemolysins may be the basis of many of the hemolytic syndromes, including acute hemolytic anemia and paroxysmal (cold) hemoglobinuria, Ham and Castle³⁵ have recently stressed the importance of intravascular stasis as a prime cause of increased blood destruction. They point out that the spleen is primarily a stasis organ, and that splenectomy is beneficial because the abnormal spherocytes are no longer subject to the hemolyzing effects of continued stasis in the spleen. They claim that increased agglutination (rather than hemolysis) is at the bottom of the experimental results of Dameshek and Schwartz, and show that a so-called "pure agglutinin" (concanavalin A) produces hemolytic anemia in animals. They point out many clinical applications of the so-called "erythrostatic theory." Although the conclusions of Ham and Castle are in certain respects probably correct (agglutinative hemolytic transfusion reactions, autoagglutinins and so forth), they fail to explain the lack of increased hemolysis in polycythemia—in which stasis is extreme—and in thrombosis of the splenic vein. That various hemolytic agents, free of any agglutinating reaction whatever, can cause hemolytic anemia is also not explained by this theory.

The relation of the spleen to increased hemolysis is still quite obscure. Ham and Castle postulate

for the spleen a simple physical or passive function; they state that the condition of blood incubating in a test tube is in many respects identical with that in the splenic sinusoids. There is a possibility, however, that the spleen participates more "actively," perhaps through obscure cellular mechanisms. After all, the spleen is somewhat more than a test tube. The dramatic effects of splenectomy in many cases of hemolytic anemia are much in favor of this idea, especially in acquired cases when there is frequently a complete reversion of the blood picture to normal. Thus the theory of so-called "hypersplenism" or of hyperactivity of the entire reticuloendothelial system must be considered, at least in some cases.

In summary, it is likely that various mechanisms are responsible for the development of hemolytic processes. Haden,³⁶ in an admirable review of hemolytic anemia, states that the factors in increased hemolysis may be summarized as follows:

- I. Increased hemolysis of normal cells damaged by foreign agents
 - a. Chemicals
 - b. Parasites
 - c. Bacterial toxins
 - d. Amboceptor and complement reactions (including hemolysins and agglutinins)

II. Increased activity of the spleen

The subject of pathogenesis is still in the process of elucidation, and the final word has certainly not been said.

Clinical studies. Farrar, Burnett and Steigman³⁷ found a hemolysin in a case of acute hemolytic anemia that was cured by splenectomy, thus confirming our own observations. Another case of acute hemolytic anemia, with spherocytosis and recovery after splenectomy, is reported by Mandelbaum.³⁸ This case is of interest in that it occurred in a seventy-five-year-old person. It also illustrates to what length writers will go to avoid the designation of acquired hemolytic jaundice. Since spherocytosis was present, a congenital hemolytic process was assumed, even though the patient was seventy-five years old, had no familial history, and had never previously been known to have either splenomegaly, anemia or jaundice. It should be continually stressed that spherocytosis is by no means pathognomonic of the congenital type. In a study of a case of typical hereditary hemolytic jaundice, Waugh and Lamontagne³⁹ make some interesting observations on the types of bilirubin present and on the hypotonic fragility of the erythrocytes. These observations are both carried out by utilizing the photoelectric colorimeter of Evelyn adapted to bilirubin and fragility measurements. Even in hemolytic icterus, a small amount of so-

called "direct" bilirubin was found. The hypotonic fragility, as determined with the photoelectric colorimeter, can be ascertained very accurately and shows very small degrees of hemolysis. With this technic Waugh and Lamontagne demonstrated that before splenectomy a few extremely fragile erythrocytes are present, disappearing after operation.

Careful and well conceived studies of a rare type of hemolytic syndrome—"paroxysmal nocturnal hemoglobinuria"—have been made by Ham⁴⁰ and by Ham and Dingle.⁴¹ Although the fundamental abnormality was found to reside in the red blood cells, a thermolabile factor essential for hemolysis and found in serum (complement) was also essential. The hemoglobinemia and hemoglobinuria were associated with sleep, and it is suggested that during sleep there is an increased intravascular hemolysis associated with increased acidity of the blood, especially of regions of the blood subject to stasis, such as the spleen. Further detailed studies bearing on the immunologic situations involved are described by Ham and Dingle.

A review of the cases of acute hemolytic anemia (acquired hemolytic icterus, acute type) has recently been made.⁴² Many of these have been mis-called "Lederer's anemia," identical cases having been described many years ago by Widál and his collaborators and by Chauffard (1907-1914). These cases are characterized by acute or subacute onset, rapidly progressive anemia, jaundice with out bile in the urine, an increased output of urobilinogen in urine and feces, and a variable blood picture. The concept that these cases are benign and respond to one or two transfusions has become prevalent, the reverse is, however, frequently true. In a number of cases, when several transfusions have been given and the patient has failed to respond, the possible dramatic results of splenectomy have unfortunately been ignored. To be sure, not all patients recover following splenectomy, which indeed is a serious procedure in this age group (usually from forty to sixty five). My routine at the present time is to give one to three transfusions, if no definite therapeutic effect takes place, splenectomy is performed without further ado. If this procedure is postponed, the patient may develop new hemolysins or agglutinins, have severe transfusion reactions, and succumb to a final "last ditch" operation.

Cooley's erythroblastic anemia This disease is receiving increasing attention, and is found chiefly in children of Greek and Italian parentage, being characterized by hemolytic anemia, the presence of large numbers of nucleated red cells and bone changes. The latter are apparently due to marked hyperplasia of the bone marrow with expansion

of the marrow cavities. Both Smith⁴³ and I⁴⁴ have described a new abnormality of the red cells in this disorder, namely, the "target cell." This erythrocyte, the antithesis of the thick spherocyte, is very thin, having the appearance of a bull's eye or target in stained smears, and is unusually resistant to hypotonic salt solutions. It may well be the inherited factor in Cooley's anemia. "Target-cell" anemia⁴⁴ is characterized by bone changes like those of Cooley's anemia, increased blood destruction, and the presence of many target cells with increased resistance to hypotonic salt solution. These cases are important in that they probably represent mild cases of Cooley's anemia, and the patients may reach adulthood and result in the propagation of the more outspoken disorder of Cooley's anemia. Under the title, "A Familial Hemopoietic Disorder in Italian Adolescents and Adults Resembling Mediterranean Disease (Thalassemia)," Wintrobe and his co-workers⁴⁵ describe a number of such cases. The name "target cell" was applied by Barrett.⁴⁶ This interesting cell is seen following splenectomy, in certain hepatic diseases, in Cooley's anemia and in sickle cell anemia.

LEUKOERYTHROBLASTIC ANEMIA

In recent years, interest has developed in a condition characterized clinically by marked splenomegaly, slowly progressive anemia of the normocytic type, leukocytosis with the presence of myelocytes, metamyelocytes and a variable number of nucleated red cells, and irregular bone changes, as demonstrated by x-ray study. Histologically, a fibrotic bone marrow is usually found in association with myeloid transformation of the spleen (ectopic bone marrow activity). The condition has been variously described as leukoerythroblastic anemia (Vaughan⁴⁷), nonleukemic myelosis (Hickling⁴⁸), myelophthisic anemia (Mettier⁴⁹), and agnogenic myeloid metaplasia of the spleen (Jackson, Parker and Lemon⁵⁰). It is probably closely related to or identical with osteosclerotic anemia and in all probability has been confused with myelogenous leukemia, particularly in certain terminal cases of polycythemia vera. As Thompson and Illyne⁵⁰ point out, replacement of the bone marrow by various foreign tissues, such as fibrosis, new bone and carcinoma may result in the above hematologic findings, which are chiefly characterized by a few myelocytes, a disproportionate number of normoblasts and reduced platelets. Jackson, Parker and Lemon point out the slow progressive character of the disorder, the average duration in 10 cases studied being 10.8 years. They give prime importance to the splenic abnormality, classifying it as "agnogenic myeloid metaplasia," that is, there is ectopic bone marrow growth of un-

known or indeterminate origin in the spleen. They rate the bone-marrow findings as of secondary importance. This is contrary to the experience and interpretation of other observers, who agree that the splenic changes are secondary to replacement of bone marrow by abnormal tissue. Emphasis on the splenic changes has led Jackson et al. to conclude that even certain cases of acute or subacute hemolytic anemia with myeloid metaplasia of the spleen are included in this syndrome. Hemolytic anemia is characterized by a very hyperplastic bone marrow and often by bone-marrow activity in other organs; the syndrome described by Vaughan, Hickling, Thompson, Mettier and others presents a bone marrow that is replaced by foreign, usually fibroblastic, tissue. Although the splenic lesions may be similar, it is probable that the conditions are entirely distinct.

Marked splenomegaly, anemia, a moderate elevation in the leukocyte count, myelocytes and nucleated red cells have generally led to the erroneous diagnosis of chronic myelogenous leukemia and to x-ray therapy. This treatment is exactly wrong, since the spleen is apparently trying desperately to fulfill the functions of the replaced marrow. The differential diagnosis from leukemia may be very difficult. It is well to remember that this picture may be the end-result of previous bone-marrow disease, whether polycythemia, osteosclerosis or metastatic malignancy, and that the terminal picture is nonspecific. Only a bone-marrow biopsy by the trephine method will surely settle the diagnosis in most cases. A puncture biopsy usually gives inconclusive results, since the marrow is hypocellular; removal of a button of sternal bone reveals the bone-marrow lesion, which is usually fibrosis, but may show, as Mettier⁴⁸ has pointed out in 10 interesting cases, osteosclerosis, Gaucher's disease, carcinomatosis, neurofibromatosis and multiple myeloma. These histologic features are readily distinguished from myelogenous leukemia. X-ray examination of the femurs may show spotty areas of diminished and increased density, and as Vaughan⁴⁶ has pointed out, the paucity of the x-ray findings is often surprising in view of the extensive replacement of bone by fibrous tissue, as seen at post-mortem examination.

POLYCYTHEMIA VERA

This disease of unknown origin is characterized by extensive hyperplasia of the entire bone marrow, with the result that the red cells, leukocytes and platelets become greatly increased in the peripheral blood. The great increase in circulating red-cell mass results in the establishment of a very viscous, slow-moving circulation. The combination of a

greatly distended circulation and a tendency to multiple thromboses accounts for the majority of the symptoms of the disorder. These are described by Dameshek and Henstell.⁵¹ These authors point out that the multiplicity of symptoms may result in the diagnosis of psychoneurosis, or if one set of symptoms is outstanding, in such diagnoses as nephritis, cardiovascular disease, migraine or peripheral vascular disease. The blood-platelet count is usually extremely high, and with the sluggish circulation and the increased blood viscosity, thrombotic manifestations are common. These frequently occur in the extremities, simulating thromboangiitis obliterans, but are not infrequently present internally. Thus cerebral thrombosis, coronary thrombosis (Miller⁵²) hepatic-vein thrombosis and portal-vein thrombosis may occur. Since many cases go unrecognized for a number of years, being treated for menopause, migraine, heart disease and so forth, it should be the rule to perform a red-cell count—not a Tallqvist hemoglobin—in any patient whose plethoric appearance makes one suspect polycythemia. Further clinical diagnostic aids are distended retinal veins, splenomegaly and hepatomegaly, and flushed mucous membranes. The erythrocyte count usually gives the diagnosis, although in doubtful cases the hematocrit, blood volume and leukocytes and platelet counts are all necessary.

Most patients go along for many years in various degrees of discomfort. The development of the degenerative diseases is accelerated, and death is usually the result of nephritis, coronary disease or a cerebral accident. In 3 of 40 cases which were followed, anemia gradually developed in association with leukocytosis and the presence of immature granulocytes and nucleated erythrocytes. Are these cases of chronic myelogenous leukemia, or do they represent fibrosis of the marrow with myeloid metaplasia of the spleen? Most observers have considered that the polycythemic condition became transformed into leukemia, but it becomes increasingly evident that these cases are not truly leukemic, but that the blood picture is simply leukemoid in type in association with a fibrotic bone marrow and a spleen that is actively attempting to produce bone-marrow cells. It is likely that the majority of the cases of leukoerythroblastic anemia, as pointed out above, have previously been unrecognized examples of polycythemia.

The best treatment for polycythemia is still being debated. X-ray therapy over bones (and marrow) and treatment with phenylhydrazine, Fowler's solution or radioactive phosphorus have all been advocated. Potentially or actually all these methods are dangerous. The induction of an iron-

deficiency state has proved safe and therapeutically effective. Venesections of 500 cc. of blood are performed twice weekly until the hemoglobin is reduced to approximately 80 per cent and the erythrocyte count to approximately 5,000,000. This usually takes from six to eight venesections. The patient is then placed on a low-iron diet, that is, restricted in meats, liver, eggs, green vegetables and rye bread. The combination of a great loss of iron (hemoglobin), together with a continued low intake of iron, results in a sustained iron-deficiency state with relatively low values for hemoglobin. The erythrocyte count under this regime gradually rises to between 7,000,000 and 8,000,000, but with the iron deficiency, the values for hemoglobin, hematocrit and red-cell mass remain low for periods of six to twelve months (average eight months). The method is safe and physiologically sound, and requires but little supervision after the first series of venesections. Estimations of the hemoglobin and hematocrit percentages become of far greater value than the erythrocyte counts.

HEMOPHILIA

Work on the nature of hemophilia continues to be pursued at the Thorndike Memorial Laboratory in Boston. It was previously shown that the clot-promoting power of normal plasma was present in the globulin fraction of the plasma, from which an extract containing so-called "globulin substance" could be prepared by acid precipitation. More recent work by Lozner and Taylor⁵³ demonstrated that the effective clot-promoting material was found in plasma euglobulin (plasma proteins insoluble in distilled water, soluble in isotonic saline). It is, of course, hoped that further fractionation will result in the development of an extract effective in the continued treatment of hemophilia, that is, in keeping the blood coagulation time at normal levels. At present, the only definitely effective treatment aside from the topical application of globulin substance is in acute hemorrhage, which is handled either by a transfusion of whole blood or plasma, or by the use of plasma euglobulin.

Brinkhous⁵⁴ presents a somewhat different concept regarding the pathogenesis of hemophilia. Studies made by this observer demonstrated that in hemophilic blood the prothrombin was converted to thrombin unusually slowly. This delay in prothrombin conversion could be corrected by adding less than 1 mg. of crude thromboplastin to 100 cc. of the abnormal blood. Brinkhous believes that the beneficial effects of transfusion are due to the addition of thromboplastin, which is derived from cells and platelets. Quick⁵⁵ has come to the same conclusion.

Aggeler and Lucia⁵⁶ have rendered a valuable service in investigating the potency of a large number (seventeen in all) of so-called "blood-coagulating substances." They found that the claims made for these preparations were, to say the least, greatly exaggerated. Most of them were completely inactive. Only those substances suitable for local use (like certain snake venoms) were at all active. Similar studies are reported by McGavack.⁵⁷ In the light of these investigations, the alleged effects of oxalic acid intravenously in the treatment of hemophilia must be greatly discounted. A report on the use of this chemical is that of Page, Russell and Rosenthal,⁵⁸ who claim a good effect in 3 cases of hemophilia by the use of repeated intravenous injections of 5 to 10 mg. The actual case reports, however, are quite unconvincing, and it is reassuring that the conclusion is made that "its use, along with other known beneficial measures, notably multiple transfusions [*italics mine*], would be warranted in attempting to control bleeding in hemophilia." McGavack also reports on the use of a substance (Koagmin) similar to oxalic acid in the treatment of hemophilia. This is an extract derived from the weed, shepherd's-purse, and contains dicarboxylic acids. In 4 cases of hemophilia treated with this material prompt shortening of the coagulation time lasted for two to four hours.

An excellent article on certain effects of hemophilia on the growing skeleton is contributed by Caffey and Schlesinger.⁵⁹ Simple hemarthrosis, panarthritis and superiosteal hemorrhage are all carefully considered. An interesting hemorrhagic diathesis with prolonged coagulation time, associated with a circulating anticoagulant, is reported by Lozner, Jolliffe and Taylor.⁶⁰ The case differed from hemophilia not only clinically but in certain physiologic respects: a transfusion failed to shorten the clotting time, and normal human plasma and globulin substance were ineffective *in vitro*. A striking finding was the presence in the blood of a substance interfering with the completion of the normal clotting mechanism. When the patient's plasma was tested *in vitro* against whole normal blood, clotting was prevented. The circulating anticoagulant might have been in some manner associated with the general lymph-node tuberculosis present.

PURPURA

Thrombocytopenic purpura. The pathology of the bone marrow in idiopathic thrombocytopenic purpura has been studied by Limarzi and Schleicher.⁶¹ A uniform finding was marked hyperplasia (increase) of megakaryocytes, with a shift

to young forms; this was particularly striking in the chronic form. Speculation is made regarding the possibility that the spleen in this disease may have an unusual inhibitory effect on platelet production by the bone-marrow megakaryocytes. This is confirmed by some recent unpublished work of Dr. E. B. Miller and myself. Despite the almost complete absence of platelets from the circulating blood, the bone marrow is crowded with megakaryocytes that produce few if any platelets. Directly following splenectomy, there is a striking increase in platelet production by the megakaryocytes, reflected quickly in the peripheral blood by a rapid increase in the platelet count.

On the other hand, Wiseman, Doan and Wilson⁶² state that "sternal marrow studies have consistently revealed normal numbers of normal appearing megakaryocytes in a normal cellular setting." They also state that they are convinced, from their supravital studies, that there is increased activity of splenic clasmatoocytes in destruction of platelets. In other words, they maintain that the marrow is normal, but the spleen is destroying an increased number of platelets in the disease. As diagnostic essentials of idiopathic thrombocytopenic purpura, Wiseman et al. list: spontaneous purpura with or without free bleeding from the mucous membranes, definite decrease in the blood platelets, normal coagulation and prothrombin times, no unusual anemia or leukocytosis, absence of pathologic cells in both the blood and the marrow, absence of recent history of the ingestion of drugs, and lack of appreciable enlargement of the spleen or lymph nodes. Regarding therapy, x-ray treatment over the spleen is considered worthless, the use of snake venom "has not been encouraging," and parathyroid extract was tried without favorable result. Transfusions help to tide the patient over until either a spontaneous remission becomes established or splenectomy is performed. It is gratifying to note that "full doses" of blood are recommended, in contradistinction to the encomiums of various authors for the use of small transfusions. Why small transfusions should possess any special virtue is a mystery I have never been able to fathom. Splenectomy is the only real cure. In the chronic case, the decision for splenectomy must be made only after repeated observations of the patient's course. The acute cases demand energetic action, which may be summarized as follows: confirmation of the diagnosis by sternal puncture; immediate transfusions; if blood loss persists, splenectomy. Of 9 splenectomized patients, 1 died of postoperative shock, and the others made uneventful recoveries. It has been my experience

in several cases that too much temporizing and indecision regarding splenectomy have led to cerebral hemorrhage and death. In the acute case, a quick decision must be made and splenectomy immediately performed, before the patient has had a chance to bleed into vital tissues.

Thrombocytopenic purpura in relation to the menarche is discussed by Goldburgh and Gouley.⁶¹ Pubertal menorrhagia may be the first indication of purpura. Splenectomy is curative and is indicated when repeated transfusions of blood and endocrine therapy have failed to check the hemorrhagic tendency.

Nonthrombocytopenic purpura. Purpura occurs either when the blood platelets become extremely low or when there is damage to the capillary walls. Such cases are divided, respectively, into thrombocytopenic purpura and vascular purpura; in the former the platelet count is low, the bleeding time increased, and the clot retraction poor, whereas in the latter the platelet count is normal, the bleeding time normal or somewhat increased and the clot retraction normal. In both conditions the clotting time is normal and the tourniquet test positive.

Most cases of purpura fall into these two groups. There are rare cases, however, in which, although the platelet count is normal, the platelets themselves are abnormal. These cases may be familial; because of the platelet abnormality, clot retraction is poor and the bleeding time is prolonged. Other familial cases of purpura are probably exaggerated forms of vascular purpura, in which the bleeding time is prolonged although the platelet count, platelet morphology and clot retraction are normal. Bruun,⁶⁴ reporting a large family of bleeders, prefers the designation "hereditary hemorrhagic diathesis" for these cases, which have been termed "pseudohemophilia" by von Willebrand⁶⁵ and others. In Bruun's cases, a hemorrhagic tendency present in both sexes had been present in four generations and in 15 of 23 members of the family. Four patients had bled to death. The outstanding abnormality was a greatly prolonged bleeding time (over an hour), with normal platelets and a normal platelet count, the tourniquet test being either normal or slightly positive.

A quite benign familial abnormality is described by Davis⁶⁶ under the name "hereditary familial purpura simplex." Spontaneous ecchymoses, mostly in women, were the presenting symptom. Diligent examination of the families demonstrated numerous other cases. No hematologic abnormalities were found, the only finding being a positive capillary resistance test in 16 of 25 cases tested. One family also showed hereditary telangiectasia

(Osler-Rendu-Weber disease). Rheumatoid arthritis and rheumatic fever were common in the families studied.

For topical application in cases of vascular purpura and perhaps in other hemorrhagic conditions, including hemophilia in which the bleeding point can be visualized, the use of Russell viper venom (Stypven) has been recommended by Page and Thomas.⁶⁷ Pledgets soaked in the solution are applied directly to the bleeding point; all intervening clots or other obstructions must be cleared away. Packing is sometimes advantageous. The venom may also be dropped directly onto the hemorrhagic area from the point of a small-caliber hypodermic needle. Sprays of venom from an atomizer may be used in the nasopharynx or to control bleeding from the uterine cervix. The Russell viper venom appears to accelerate the action of thromboplastic substances and to act with the latter in a synergistic manner.

HYPOTHROMBINEMIA

The recognition, careful study and treatment of hypoprothrombinemia, or vitamin K deficiency, represent one of the milestones of medical progress of the past decade. The story of vitamin K, its deficiency and its value in clinical medicine is well known. For the interested reader, the review by Quick⁶⁸ is recommended. The test that has proved of greatest value in determining the prothrombin time is that of Quick.⁶⁸ An important advance in performance of the test, as described by Souter, Kark and Taylor⁶⁹ is the preparation of a stable thromboplastin. This is a lyophilized rabbit-brain extract that can be kept indefinitely. Before use it is suspended in salt solution.

Vitamin K deficiency may develop in conditions other than obstructive jaundice: inadequate dietary, particularly of fats, impaired gastrointestinal digestion, unusual loss of fats from the bowel and severe hepatic damage. Prolonged dietary deficiency as a cause of hypoprothrombinemia is emphasized by Kark and Lozner.⁷⁰ In the 4 cases studied, multiple deficiencies were present (scurvy, subclinical pellagra), thus offering further evidence that nutritional deficiency in man is rarely, if ever, confined to a single factor. In newborn infants a potential hypoprothrombinemia is probably usually present, and in some infants a hemorrhagic tendency associated with excessively low prothrombin values may be present. Quick and Grossman⁷¹ found that the prothrombin concentration of infants' blood, nearly normal at birth, drops abruptly during the first few days of life, and then usually recovers rapidly. The quick recovery is thought to be due to the establishment of

the normal bacterial flora in the intestines, with resultant initiation of the synthesis of vitamin K. Hemorrhagic disease of the newborn is due to a delayed restoration of the prothrombin level. Although the condition may be very severe, it is promptly cured by the oral administration of vitamin K. Poncher and Kato⁷² describe a micro-method for the determination of prothrombin, and report on the treatment of 22 infants with hypoprothrombinemia. The average prothrombin time of 10 patients before treatment was 210 seconds (normal, about 25 seconds), and in 12 other patients was more than 300 seconds. Synthetic preparations of vitamin K were administered either orally, intramuscularly or subcutaneously. A therapeutic effect was present within two to six hours. Transfusions were not necessary. Shettles, Delfs and Hellman⁷³ make the important observation that the plasma-prothrombin level of the newborn infant can be increased not only by feeding vitamin K concentrate directly to the infant after birth, but by administering it to the mother prior to delivery. The values obtained with maternal administration are often three times those normally seen, and in general are higher than can be attained by administering vitamin K concentrate to the newborn infant.

The treatment of vitamin K deficiency is becoming much simpler with the elaboration of numerous synthetic products, some of which may be given parenterally. Kark and Souter⁷⁴ report on the treatment of 18 patients with hypoprothrombinemia by the parenteral administration of a water-soluble derivative of 2-methyl,1,4-naphthoquinone. Within a few hours of the intravenous or intramuscular administration of the material, the bleeding was satisfactorily controlled and the prothrombin time was normal. On the other hand, 12 patients with hypoprothrombinemia associated with hepatic disease did not respond to intensive parenteral administration. Thus, if the prothrombin time of a patient with jaundice fails to become normal after treatment, it is evident that hepatic disease is present and the prognosis poor. Andrus and Lord⁷⁵ administered 2-methyl,1,4-naphthoquinone dissolved in corn oil intramuscularly. Single injections intramuscularly of as little as 2 mg. in 2 cc. of oil restored the plasma prothrombin level by as much as 48 per cent, an effect that became evident within eight hours after injection and might be prolonged for as long as a week.

SPLENIC DISEASE

Very little that is new has been reported during the past year on this subject. The pathogenesis of so-called "Banti's disease" is discussed by

Thompson⁷⁶ on the basis of 137 well-studied cases falling into the general category. It was found that the condition resulted from a variety of primary lesions that produce splenic-vein hypertension. The conclusion is made that the syndrome is a secondary mechanical congestive splenomegaly and that there is no reason for assuming the presence of an unknown toxic agent or for retaining the concept of three stages in the development of Banti's disease. Cirrhosis of the liver exists only as one of several obstructive mechanisms (it was present in 68 per cent of the cases); if it is not present at the time of splenectomy, it will not develop subsequently. The splenic histology is the same in all types. Extrahepatic lesions responsible for congestive splenomegaly, which is suggested as a better term than Banti's disease, are thrombosis of the portal or splenic veins and compression of the splenic vein (in infants and children).

A somewhat different interpretation of the Banti syndrome is that of Ravenna,⁷⁷ who believes that the condition is a "fibrocongestive splenomegaly." Although this author concludes that the condition is due largely to splenic congestion, he suggests that this may be caused by "primary" lesions of the small splenic arteries that regulate the flow of blood into the spleen, with secondary portal hypertension. That the Banti syndrome cannot be clinically differentiated from cases of cirrhosis of the liver in which portal hypertension is definitely primary is not discussed. It seems that the views of Thompson and his co-workers adequately explain the pathogenesis of the great majority of the cases, although it cannot be denied that an occasional case may be better explained by Ravenna's thesis.

The removal of very large spleens is discussed by Henry,⁷⁸ who has had considerable experience in the tropics. It is emphasized that splenectomy in these cases frequently results in a relaxation of the diaphragm caused by "loss of the cushion on which it has long been moulded and stretched." It is well known that chest complications are frequent following splenectomy, and to obviate these effects, Henry recommends the use of a rubber balloon attached to a source of carbon dioxide and left in place under the diaphragm in the splenic bed after removal of the spleen. The balloon may be gradually deflated and removed after a few days.

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REFERENCES

1. Fowler, W. M. and Tidrick, R. T. Unusual manifestations of infectious mononucleosis. *Am. J. Clin. Path.* 10:548-553, 1940.
2. Bernstein, A. Infectious mononucleosis. *Medicine* 19:85-159, 1940.
3. Davidsohn, I. M.: personal communication
4. Templeton, H. J. and Sutherland, R. T. Exanthem of acute mononucleosis. *J. A. M. A.* 113:1215, 1939.
5. Gall, L. A. and Stout, H. A. Histological lesion in lymph nodes in infectious mononucleosis. *Am. J. Path.* 16:433-448, 1940.
6. Smith, P. K. Effects of sulfanilamide and sulfapyridine upon blood pigments of white rats. *Am. J. M. Sc.* 200:183, 1940.
7. Harris, J. S. and Michel, H. O. Formation of methemoglobin and sulfhemoglobin during sulfanilamide therapy. *J. Clin. Investigation* 18:507-519, 1939.
8. Vigness, L., Watson, C. J. and Spink, W. W. Relation of methemoglobin to cyanosis observed after sulfanilamide administration. *J. Clin. Investigation* 19:83-87, 1940.
9. Erf, L. A. and MacLeod, C. M. Increased urobilinogen excretion and acute hemolytic anemia in patients treated with sulfapyridine. *J. Clin. Investigation* 19:451-458, 1940.
10. Paul, J. T. and Limarzi, L. R. Toxic and therapeutic response of blood and bone marrow to sulfanilamide. *Proc. Soc. Exper. Biol. & Med.* 43:29-32, 1940.
11. Spence, H. M. and Roberts, G. M. Extreme leukocytosis and acute hemolytic anemia associated with administration of sulfanilamide: report of case. *New Eng. J. Med.* 222:874-876, 1940.
12. Lundsteer, E., Meulengracht, E. and Rischel, A. Chronic acetaminophen poisoning: as the result of continuous use of "Mixed Heals or Powders" or similar compounds. *Acta med. Scandinav.* 96:402-403, 1938.
13. Abbott, O. D. and Ahmann, C. F. Iron deficiency anemia in children. *Am. J. Dis. Child.* 58:811-816, 1939.
14. Hahn, P. F., Bale, W. F., Lawrence, E. O. and Whipple, G. H. Radioactive iron and its metabolism in anemia: its absorption, transportation, and utilization. *J. Exper. Med.* 69:739-753, 1939.
15. Hahn, P. F., Bale, W. F., Hettig, R. A., Kamen, M. D. and Whipple, G. H. Radioactive iron and its excretion in urine, bile, and feces. *Ibid.* 70:443-451, 1939.
16. Hahn, P. F., Ross, J. F., Bale, W. F. and Whipple, G. H. Utilization of iron and rapidity of hemoglobin formation in anemia due to blood loss. *Ibid.* 71:731-736, 1940.
17. Müller, L. L. and Hahn, P. F. Appearance of radioactive iron in hemoglobin in red cells: significance of "easily split" iron. *J. Biol. Chem.* 134:585-590, 1940.
18. Lyons, R. H. and Brenner, C. Erythropoiesis following bleeding peptic ulcer. *Am. J. M. Sc.* 198:492-501, 1939.
19. Bethell, F. H., Gardiner, S. H. and MacKinnon, F. Influence of iron and diet on blood in pregnancy. *Ann. Int. Med.* 13:91-100, 1939.
20. Dyke, S. C. and Dyas, G. E. Herniation of stomach with anemia. *Lancet* 1:119-122, 1940.
21. Fouts, P. J., Helmer, O. M. and Lepkovsky, S. Nutritional microcytic hypochromic anemia in dogs cured with crystalline factor I. *Am. J. M. Sc.* 199:163-166, 1940.
22. Borson, H. J. and Meitner, S. R. Relief of hypochromic anemia in dogs with synthetic vitamin B₁₂: influence of "filtrate factors". *Proc. Soc. Exper. Biol. & Med.* 43:429-432, 1940.
23. Olcé, I.: personal communication.
24. Schemm, F. R. Pernicious anemia family: five authenticated cases in same generation. *Am. J. M. Sc.* 199:167-171, 1940.
25. Schindler, R., Kirsner, J. B. and Palmer, W. L. Atrophic gastritis: gastroscopic studies of effects of liver and iron therapy: preliminary report. *Arch. Int. Med.* 65:78-89, 1940.
26. Israëls, M. C. G. and Wilkinson, J. F. New observations on etiology and prognosis of achrestic anaemia. *Quart. J. Med.* 9:163-176, 1940.
27. Castle, W. B., Rhoads, C. P., Lawson, H. A. and Payne, G. C. Etiology and treatment of sprue. *Arch. Int. Med.* 56:627-699, 1935.
28. Rodríguez-Molina, R. Hematology of sprue: report on one hundred cases in Puerto Rico. *Puerto Rico J. Pub. Health & Trop. Med.* 15:89-100, 1939.
29. Koller, F. Ueber die Haemolyse des Morbus Biermer und der Sprue Perniciosa. *Schweiz. med. Wchnschr.* 70:54-57, 1940.
30. Strauss, M. B. and Pohle, F. J. The duration of remission in pernicious anemia with liver therapy. *J. A. M. A.* 114:1318-1320, 1940.
31. Strauss, M. B., Solomon, P. and Fox, H. J. Combined degeneration of spinal cord in pernicious anemia: results of 7 years' experience with parenteral liver therapy. *New Eng. J. Med.* 222:373-375, 1940.
32. Dameshek, W. and Schwartz, S. O. Acute hemolytic anemia (acquired hemolytic icterus, acute type). *Medicine* 19:331-337, 1940.
33. Naegeli, O. *Blutkrankheiten und Blutdiagnostik*. Third edition (63 pp.). Berlin: Walter de Gruyter & Co., 1919. P. 408.
34. Haden, R. L. The mechanism of the increased fragility of the erythrocytes in congenital hemolytic jaundice. *Am. J. M. Sc.* 188:41-44, 1934.
35. Dameshek, W. and Schwartz, S. O. The presence of hemolysis in acute hemolytic anemia: preliminary note. *New Eng. J. Med.* 218:5-8, 1938.
36. Tigertt, W. D. and Duncan, C. N. Erythrocyte morphology in experimental hemolytic anemia as induced by specific hemolysin. *Am. J. M. Sc.* 200:173-182, 1940.
37. Ham, T. H. and Castle, W. B. Studies on destruction of red blood cells. *Proc. Am. Philosoph. Soc.* 82:411-419, 1940.
38. Haden, R. L. Hemolytic anemia. *J. Lab. & Clin. Med.* 26:65-81, 1940.
39. Farrar, G. E., Jr., Burnett, W. E. and Steigman, A. J. Hemolytic anemia and hepatic degeneration cured by splenectomy. *Am. J. M. Sc.* 200:164-172, 1940.
40. Mandelbaum, H. Congenital hemolytic jaundice: report of case of congenital hemolytic jaundice: initial hemolytic crisis occurring at the age of 75: splenectomy followed by recovery. *Ann. Int. Med.* 13:87-883, 1939.
41. Waugh, T. R. and Lamontagne, H. Some observations upon case of hereditary hemolytic jaundice. *Am. J. M. Sc.* 199:172-181, 1940.
42. Ham, T. H. Studies on destruction of red blood cells: investigation of mechanism of hemolysis, with observations in five cases. *Arch. Int. Med.* 64:1271-1305, 1939.

- 41 Ham T H and Dingle J H Studies on destruction of red blood cells chronic hemolytic anemia with paroxysmal nocturnal hemoglobinuria certain immunological aspects of hemolytic mechanism with special reference to serum complement *J Clin Investigation* 18 657 672, 1939
- 42 Smith C H The anemias of early infancy pathogenesis and diagnosis *J Pediatr* 16 375 395, 1940
- 43 Dameshek W Target cell anemia acanthocytic type of Cooley's erythroblastosis *Am J M Sc* 200 445 454 1940
- 44 Winrobe M M, Matthews E, Polla K R and Doherty B M A familial hemopoietic disorder in Italian adolescents and adults resembling Mediterranean disease (thalassaemia) *J A M A* 114 1530 1538 1940
- 45 Barrett A M A special form of erythrocyte possessing increased resistance to hypotonic saline *J Path & Bact* 46 603 618 1938
- 46 Vaughan J M Leuco erythroblastic anaemia *J Path & Bact* 42 541 564 1936
- 47 Vaughan J M and Harrison C V Leuco-erythroblastic anaemia and myelocytosis *Ibid* 48 339 352, 1939
- 48 Hocking R A Chronic non leukaemic myelosis *Quart J Med* 6 253 2 5 1937
- 49 Mettler S R Hematologic aspects of space consuming lesions of bone marrow (myelophthisic anemia) *Ann Int Med* 14 436 448 1940
- 50 Jackson H Jr, Parker F Jr and Lemon H M Agnogenic myeloid metaplasia of spleen syndrome simulating other more definite hematologic disorders *New Eng J Med* 222 985 994 1940
- 51 Thompson W P and Illingworth C A Clinical and hematologic picture resulting from bone marrow replacement *M Clin North America* 24 841 853 1940
- 52 Dameshek W and Henstell H H Diagnosis of polycythemia *Ann Int Med* 13 1360-1387 1940
- 53 Miller H R Occurrence of coronary artery thrombosis in polycythemia vera *Am J M Sc* 198 323 329 1939
- 54 Lozner E L and Taylor F H L Coagulation defect in hemophilia studies of clot promoting activity associated with plasma globulin in hemophilia *J Clin Investigation* 18 821 825 1939
- 55 Brinkhaus H M Study of clotting defect in hemophilia delayed formation of thrombin *Am J M Sc* 198 509 516 1939
- 56 Quack A J Classification of hemorrhagic diseases due to defects in coagulation mechanism of blood based on recently published studies *Am J M Sc* 199 118 132, 1940
- 57 Aggeler P M and Lucia S P Potency of blood-coagulating substances biologic assay *Am J M Sc* 199 181 194 1940
- 58 McGavack T H Some recent advances in treatment of hemophilia *M Clin North America* 24 791 805 1940
- 59 Page R C Russell H K and Rosenthal R L Effect of oxalic acid intravenously on blood-coagulation time in acute hemophiliacs *Ann Int Med* 14 78 86 1940
- 60 Caffey J and Schlesinger E R Certain effects of hemophilia on growing skeleton some roentgenographic observations on overgrowth and dysgenesis of epiphyses associated with chronic hemarthrosis *J Pediatr* 16 549 565 1940
- 61 Lozner E L, Jolliffe L S and Taylor F H L Hemorrhagic diathesis with prolonged coagulation time associated with circulating anticoagulant *Am J M Sc* 199 318 327 1940
- 62 Luzzati L P and Schleicher E M Reaction of peripheral blood and bone marrow in chronic hemorrhage and in essential thrombocytopenic purpura *J A M A* 114 12 18 1940
- 63 Wiseman B K, Dorn C A and Wilson S J Present status of thrombocytopenic purpura with special reference to diagnosis and treatment *J A M A* 115 8-13 1940
- 64 Goldburgh H L and Gouley B A Postpubertal menorrhagia and its possible relations to thrombocytopenic purpura hemorrhagica *Am J M Sc* 200 499 505 1940
- 65 Bruun E Hereditary hemorrhagic diathesis *Acta med Scandinavica* 102 639 648 1939
- 66 von Willebrand E A cited by Bruun**
- 67 Davis E Hereditary familial purpura simplex *Lancet* 2 1110 1114 1939
- 68 Page R C and Thomas E G Local application of Russell viper venom for control of hemorrhage *M Clin North America* 24 777 789 1940
- 69 Quick A J The nature of the bleeding in jaundice *J A M A* 110 1658 1662 1938
- 70 Souter A W Kark R and Taylor F H L Stable thromboplastin for use in Quick's prothrombin test *Science* 91 532 1940
- 71 Kark R and Lozner E L Nutritional deficiency of vitamin K in man study of four non jaundiced patients with dietary deficiency *Lancet* 2 1162 1939
- 72 Quick A J and Grossman A M Nature of hemorrhagic disease of newborn delayed restoration of prothrombin level *Am J M Sc* 199 1 9, 1940
- 73 Poncher H G and Kato K Treatment of hypoprothrombinemia hemorrhagica neonatorum (hemorrhagic disease of newborn) with vitamin K *J A M A* 115 14 17 1940
- 74 Shettles L B Dells E and Hellman L M Factors influencing plasma prothrombin in newborn infant antipartum and neonatal ingestion of vitamin K concentrate *Bull Johns Hopkins Hosp* 65 419-426 1939
- 75 Kark R and Souter A W Synthetic vitamin K in treatment of hypoprothrombinemia *Lancet* 1 1149 1153 1940
- 76 Andrus W DeW and Lord J W Jr Correction of prothrombin deficiencies by means of 2 methyl 1 4 naphthoquinone injected intramuscularly *J A M A* 114 1336 1940
- 77 Thompson W P Pathogenesis of Banti's disease *Ann Int Med* 14 255 262 1940
- 78 Ravenna P Banti syndrome (fibrocongestive splenomegaly) definit on classification and pathogenesis *Arch Int Med* 66 8 9 832 1940
- 79 Henry A K Removal of large spleens *Brit J Surg* 27 464 474, 1940

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27171

PRESENTATION OF CASE

First Admission. A fifty-eight-year-old garage-man entered the hospital complaining of weakness, dizziness, exertional dyspnea and numbness in the fingers.

Two years before admission he noticed slight discomfort around and below his umbilicus, which occurred half an hour after meals and was worse in the morning. This was followed by nausea without vomiting, and gradual subsidence of the symptoms by the next mealtime. Eighteen months before admission numbness and aching appeared in the calves during activity, and the patient found it necessary to watch his feet while walking and lost his balance when his eyes were closed. One year prior to entry dyspnea on exertion developed, and some time later he suffered from transient soreness of the gums and hard palate. Six weeks before admission marked the onset of weakness, lethargy and inability to concentrate, and a sensation of "pins and needles" appeared in the hands and feet, with "deep bone" soreness and swelling of the feet. The numbness and cramps in his legs and feet increased and often awakened him at night; relief could be obtained only by exercise. The patient had not lost more than 7 pounds in weight.

The family history was irrelevant. Fourteen years before admission the patient had had an attack of epigastric pain and jaundice and was told that he was anemic. At forty-five he had had three attacks of gonorrhea in rapid succession. No occupational hazard could be elicited. Although his diet seemed adequate the patient ate very little meat.

On examination the patient was well developed and well nourished and in no apparent distress. The skin had a sallow lemon tint, with questionable icterus of the scleras. The mucous membranes were pale, and the tongue thick and smooth, with atrophy of the papillas. There was cardiac enlargement, and a soft blowing apical systolic murmur, but the blood pressure was 120 systolic, 60 diastolic. Pitting edema of the feet and ankles was present, and muscle tenderness in the calves. The knee jerks were hyperactive; vibration sense was

diminished at the ankles, but position sense was fairly good in the great toes. The gait was a little waddling with a positive Romberg sign.

The temperature was 99.5°F., the pulse 93, the respirations 22.

The urine was normal. The blood showed a red-cell count of 1,230,000 with a hemoglobin of 40 per cent, and a white-cell count of 3850 with 60 per cent polymorphonuclears; the platelets were diminished. The red cells showed pronounced poikilocytosis, anisocytosis and some polychromophilia, with many large cells well filled with hemoglobin. The serum van den Bergh was slightly above normal, the icteric index 7. The serum proteins were 6.1 gm. per 100 cc., and the chlorides were equivalent to 109 cc. N/10 sodium chloride. A blood Hinton test was negative. Gastric analysis revealed achlorhydria.

A gastrointestinal series was negative.

The patient was given intramuscular liver injections and a high-vitamin, high-calorie diet. The reticulocytic response was satisfactory, and he improved symptomatically, being discharged to the Out Patient Department three weeks after admission, when the red-cell count was 3,590,000, and the hemoglobin 60 per cent.

Second Admission (five years later). The patient was followed in the Out Patient Department for two years, where he was given intramuscular injections of liver extract once a week, the red-cell blood count remaining around 4,500,000 with a hemoglobin of 80 per cent. For the next two years he made his own oral preparation according to recipe, but for more than a year before admission he had had no liver preparation whatever, and made little effort to include it in his diet. One month before admission, dizziness, weakness, dyspnea, and numbness in the fingers returned and increased so that once again he came to the hospital.

Physical examination was as before, including the neurologic findings and peripheral edema. The upper border of the liver was at the sixth space while the lower border was percussed three finger breadths below the costal margin in the mid-clavicular line.

The blood showed a red-cell count of 1,770,000 with a hemoglobin of 54 per cent, and a white-cell count of 1800; the platelets were reduced. The red cells showed poikilocytosis, anisocytosis and macrocytosis. The serum van den Bergh was 2.1 mg. per 100 cc., biphasic, and the nonprotein nitrogen 32 mg. The stools were normal.

A gastrointestinal series showed the folds of the stomach to be widened. Arising from the greater curvature and posterior wall of the antrum of the stomach was a broadly based, slightly lobulated

tumor mass, approximately 25 cm in width. An electrocardiographic recording showed normal rhythm with a rate of 100 and a PR interval of 0.15 second; P waves were not visualized well in Leads 1 and 2, and there was a tendency to left-axis deviation.

On gastroscopic examination the mucosa throughout the stomach was very pale and smooth, but normal to large rugae were present and the blood vessels were not seen shining through the mucosa. In the antrum there appeared to be a smooth nonulcerated polypoid mass. The patient remained in the hospital for three weeks and made a good response to intramuscular injections of liver extract.

Third Admission (ten days later). The patient remained at home, then returned to the hospital. An operation was performed three days after admission, following two 500 cc. blood transfusions.

DIFFERENTIAL DIAGNOSIS

DR WYMAN RICHARDSON: This is a typical story of pernicious anemia with combined system disease. The most interesting feature develops toward the end of the story and concerns the nature of the gastric tumor.

The history is quite consistent with pernicious anemia, and all the symptoms can be explained on that basis. Whether the nausea without vomiting can be explained on that basis alone is perhaps not certain. I think it probably should be explained in that way.

"... and was told that he was anemic." I am going to leave that and not come back to it. It could have been the onset of pernicious anemia fourteen years previously but more likely had nothing to do with his illness. The tongue was thick, and one does not usually get a thick tongue in pernicious anemia—it is usually in iron-lack anemia that the tongue is thick and boggy.

The argument whether or not patients with combined system disease can be improved is often raised. Symptomatically they do improve with massive doses of liver extract. I believe that it is wise to give these patients a crude preparation of liver by mouth, as well as parenteral liver. There have been pathologists who argue that you cannot get improvement in combined system disease because the pathological findings are inconsistent with any reversible change; but given a patient with symptoms, one does not know what the disease of that cord is. I am sure you can get improvement in central nervous system symptoms with liver, and in the early stages the changes are reversible. I think it is true that the longer the symptoms exist the less likely they are to improve, and I know it is true that ataxia is much easier to treat than spasticity.

A strange thing about patients with pernicious anemia in relapse is that they get frightfully stubborn. You can talk to them and explain the whole situation. However, following treatment they feel so well they say, "Perhaps that doctor was wrong. I shall stop liver and see what happens." They stop, and they get worse. Finally the old symptoms return. Then they get stubborn and think of every conceivable reason why they are going downhill rather than the obvious one—that they are not getting liver. It is always dangerous to stop liver for the purpose of discovering whether patients actually need to continue it. It is necessary sometimes but requires great care in follow-up.

May we look at the x ray films?

DR JAMES R. LINGLEY: I cannot add to the report in the record. The films show this mass arising from the greater curvature, starting about 5 cm. above the pylorus. The mass is sharply defined and slightly lobulated, and there is some spasm of the antrum but no definite rigidity of the lesser curvature. It is larger than the usual polyp and more consistent with cancer.

DR RICHARDSON: Dr. Benedict, do you want to say anything in regard to the gastroscopy in addition to what I have read?

DR EDWARD B. BENEDICT: The mucosa was smooth and pale, but the blood vessels were not visible, a finding that is an indication that the mucosa was not really atrophic. Very likely the absence of complete atrophy was because the patient had had liver therapy. The polypoid mass was smooth and round, one could not be sure whether it was an adenoma or cancer.

DR. RICHARDSON: The problem of whether or not this lesion was malignant is absolutely impossible to solve clinically, and may even be difficult for Dr. Mallory. In the first 100 cases of pernicious anemia that we studied here after liver therapy was begun, there were 4 patients in whom we found polyps, and if Dr. Benedict had been here with his gastroscope, we should have undoubtedly found more. I do not know where he would put the incidence of polyps in the stomach with Addisonian anemia, but I should think it would be around 15 or 20 per cent. Is that high?

DR. BENEDICT: I have no figures, but I should think that is a little high.

DR. RICHARDSON: It is my impression that in the old days before liver therapy those patients who had remissions and relapses with no specific therapy developed polyps in much larger proportion than our patients do now. If a fairly high percentage of patients with pernicious anemia develop polyps, and if a fairly high percentage of the polyps become malignant, then one would expect that carcinoma would develop frequently in per-

nicious anemia. In my experience, however, it is rare to find carcinoma in a patient who has definite pernicious anemia. Of course one may see secondary types of macrocytic anemia with a widespread cancerous involvement of the stomach. I think, therefore, that when these patients with pernicious anemia are treated with liver the mucous membrane improves in its general consistence, and polyps no longer develop. This man probably would not have developed a tumor if he had maintained his liver intake.

Is this tumor malignant? I am going to guess that it is not, but there is no real basis for making a guess. One other point, I question the advisability, — and Dr. Sweet will perhaps disagree with me on this, — if one is contemplating a fairly radical gastric operation, of giving two 500-cc. blood transfusions preoperatively in a patient who presumably has had time to restore his blood volume and blood level to normal. Is it not taking an unnecessary risk? May you not get a transfusion reaction, not necessarily due to incompatibility, that will make the postoperative course more stormy than it need be?

DR. RICHARD H. SWEET: I agree with that absolutely. When the blood is up to normal, I see no indication for transfusion. We see reactions not infrequently, and I have seen some lately, especially in patients with an anemia. They occur with properly grouped bloods, and no adequate explanation has been found for them. Although we always postpone the operation in such a case, I have never known such a reaction to be responsible for postoperative difficulties.

DR. RICHARDSON: I thought that you might operate in a period before the reaction occurred, because many are delayed.

DR. SWEET: That is correct, and I do not like to transfuse my patients and operate immediately. I usually do it two or three days ahead of time.

DR. RICHARDSON: To summarize, I think this is a case of Addisonian anemia in a patient who eventually developed a polyp in the stomach; the polyp was removed and I hope it will prove to be benign, that is, without any malignant degeneration.

DR. BENEDICT: I do not quite agree with what you say in regard to the incidence of malignant degeneration. In a study of adenomatous polyps of the stomach, Dr. Allen and I* found that 40 per cent became malignant. In this particular patient I thought that the adenoma was of such a size it probably was malignant. I have seen quite a number of patients with pernicious anemia and carcinoma, and believe that all patients with per-

nicious anemia should have gastrointestinal series and gastroscopic examinations at frequent intervals.

DR. RICHARDSON: Even when they have had adequate treatment?

DR. BENEDICT: Yes.

DR. RICHARDSON: I do not believe that. Have you any figures?

DR. BENEDICT: No.

DR. TRACY B. MALLORY: There are a number of studies accumulating which tend to show that patients who eventually develop carcinoma of the stomach have had gastric anacidity for years. On this basis it has been argued that a persistent anacidity in a young person may be considered a strong indication that that patient is likely to develop cancer of the stomach.

CLINICAL DIAGNOSES

Pernicious anemia.

Carcinoma of the stomach.

DR. RICHARDSON'S DIAGNOSES

Pernicious (Addisonian) anemia, with combined system disease.

Adenomatous polyp of stomach (benign?).

ANATOMICAL DIAGNOSIS

Polypoid carcinoma of the stomach.

PATHOLOGICAL DISCUSSION

DR. MALLORY: Gastric resection was done, and an obvious tumor was found in the stomach. It did not look in the resected specimen very much as it does in the x-ray films. There it seemed to be a definitely polypoid tumor, projecting a considerable distance into the lumen of the stomach. We found a distinctly flat, wide lesion. It did not look particularly polypoid. Post-mortem relaxation of the gastric musculature, particularly, I suspect, of the muscularis mucosae, is the probable explanation. The base was not detectably indurated. On microscopic examination, beginning sharply at each edge of the polyp, the glandular tissue was markedly atypical. The cells were rapidly growing, with many mitotic figures, and the nuclei were hyperchromic and quite disoriented. Cytologically there could be no doubt that the tissue was malignant. Throughout most of the tumor there was no sign of invasion, but in the center of one section we did find a definite spot of invasion extending only 1 mm. below the muscularis mucosae. Therefore, this is not merely carcinoma in situ but has to be regarded as established cancer.

DR. RICHARDSON: I agree that patients with

*Benedict, E. B. and Allen, A. W. Adenomatous polypi of the stomach. *Surg., Gynec. & Obst.* 58:79 64, 1934.

pernicious anemia should be studied for carcinoma, but what I rather question is, if they are adequately treated, must one then feel obliged to continue gastrointestinal x rays at frequent intervals?

DR BENEDICT I think that these patients should be followed by x ray studies and by gastroscopy at least three times a year. Perhaps you would say that the patients with pernicious anemia and cancer whom I have in mind were not adequately treated with liver, but they were under observation in this hospital by good men.

CASE 27172

PRESENTATION OF CASE

A fifty two year-old woman entered the hospital complaining of nausea and vomiting of two days' duration.

Six months before admission the patient first noticed slight vaginal bleeding occurring at irregular intervals. She consulted her physician, and a biopsy was taken of the cervix, which was reported as carcinoma. Following this diagnosis the patient was given twenty x ray treatments at another hospital and remained well until two months before admission, when she began to suffer from frequency, incontinence and severe burning during and immediately following urination. Bladder irrigations gave some relief, but occasionally she noticed small blood clots in the urine and gradually an aching pain developed in her entire pelvis and upper thighs. A cystoscopic examination one week before admission was said to have revealed involvement of the bladder by tumor. The patient had always been troubled by constipation, but this had increased appreciably during the last two months and blood occasionally appeared in the stools. Two days before admission persistent nausea, vomiting and obstipation appeared, but there was no pain or abdominal distention.

Twelve years before admission the patient had had a supravaginal hysterectomy for leiomyomas. Her father had died at seventy two of cancer of the bowel.

The patient was in no apparent distress, but was pale with a questionable icteric tint to the skin and scleras. The heart and lungs were normal, the blood pressure was 130 systolic, 80 diastolic. There was a healed suprapubic surgical incision, the abdomen was soft, with moderate suprapubic tenderness. Rectal examination was negative.

The temperature, pulse and respirations were normal.

The urine showed a ++ test for albumin, and the sediment contained 15 white cells and 2 red cells per high power field, with many bacteria, a culture yielded an abundant growth of alpha hemolytic

streptococci. The blood showed a red cell count of 4,100,000 with 89 gm of hemoglobin (photoelectric cell technique), and a white-cell count of 10,500. The nonprotein nitrogen of the blood serum was 17 mg per 100 cc, and the chlorides 999 milliequiv and the carbon dioxide combining power 23.1 milliequiv per liter, a serum van den Bergh was normal, and the blood Hinton reaction negative. Examination of the stools was negative.

A plain x ray film of the abdomen showed a large amount of gas and fecal material in the colon. There were some gas filled loops of small bowel in the midabdomen, but these were not dilated.

During hospitalization the patient was drowsy, and became nauseated and vomited from time to time, satisfactory bowel movements were obtained with the help of enemas. Gradually her urinary output dropped, and two weeks after admission the nonprotein nitrogen was 100 mg per 100 cc, and the chlorides 102 milliequiv per liter. She developed uremic twitchings and anuria. Finally drowsiness deepened to coma, and the signs of bronchopneumonia appeared. Death occurred three weeks after admission.

DIFFERENTIAL DIAGNOSIS

DR RICHARD CHUTE Here we have a fifty two year-old woman with carcinoma of the cervix, proved six months previously. At that time she was given twenty x ray treatments at another hospital, presumably of 200 to 300 r apiece so that we may guess she received a total of 4000 to 6000 r, focused on the carcinoma of the cervix. That would be enough to cause a regression of the disease, but in most cases would not be enough to destroy the carcinoma completely. Therefore, in my opinion, the carcinoma was arrested but probably not destroyed. Four months afterward, — two weeks before admission, — she had frequency, incontinence and burning, and noticed some small blood clots in the urine. Cystoscopic examination a week before admission was said to have revealed extension of the tumor into the bladder, a happening which is frequent in carcinoma of the cervix. She noticed pain in the pelvis and upper thighs, which would also suggest extension of the tumor into the tissues of the pelvis. Blood occasionally appeared in the stools, this suggests the possibility that the rectum had been invaded by the carcinoma, but rectal examination later on was negative, and one examination of the stools was negative, so that I am going to guess that this blood was due to hemorrhoids, not to rectal involvement.

The supravaginal hysterectomy for leiomyomas twelve years before probably had nothing to do with the present picture except that it is too

bad that the cervix was not also taken out at that time. There was a family history of carcinoma. Two days before admission, that is, six months after her trouble began and several months after the x-ray therapy, nausea, vomiting and obstipation appeared, but no pain or abdominal distention. When she came in she had a moderate secondary anemia. It is said that she had a questionable icteric tint to the skin, but later on the van den Bergh test was reported as normal, so that I doubt the jaundice. The urine showed some blood, which would be consistent with involvement of the bladder with tumor—a few pus cells and alpha-hemolytic streptococci are fairly frequently found in the urinary tract and usually do not have serious pathological significance. The nonprotein nitrogen, the chlorides and the carbon dioxide combining power were essentially normal.

The patient was drowsy, nauseated and vomited from time to time, and her abdomen was somewhat distended at the end. Gradually the urinary output dropped. Two weeks after admission the nonprotein nitrogen had risen to 100 mg. per 100 cc. and she developed uremic twitching and anuria, dying from what I suppose was uremia, with terminal bronchopneumonia.

Jaffe, Meigs, Graves and Kickham* have shown that a great proportion of patients with carcinoma of the cervix die in uremia from obstruction of the ureters. This is usually due to tumor growth, or to tumor that has been fibrosed by radiation therapy. Sometimes the constriction of the ureters is entirely due to fibrosis following radiation therapy, without any tumor tissue's playing a part in producing the constriction. In some cases the carcinoma of the cervix has been completely cured, but ureteral occlusion by postradiation fibrosis has been responsible for death.

It would seem to me that we are dealing in this case with a carcinoma of the cervix that had had inadequate x-ray therapy, and that had extended through the pelvis, involving the bladder and the ureters. Also it is possible that the ureters were constricted purely by fibrosis following radiation therapy, without tumor's playing a part, but my guess is that tumor was actually obstructing them. Therefore, I am going to make a diagnosis of carcinoma of the cervix involving the ureter, with extension to the bladder, bilateral hydroureter and hydronephrosis.

DR. F. DENNETTE ADAMS: May I ask Dr. Chute if he believes that carcinoma of the cervix can be cured by irradiation? He made a distinction

between destruction of the tumor and arrest of the disease.

DR. CHUTE: I do believe that carcinoma of the cervix can be cured by irradiation therapy, but I do not believe that it can be cured with 4000 to 6000 r delivered through the skin by an x-ray machine.

DR. ADAMS: But do you believe it can be cured by irradiation?

DR. CHUTE: My opinion is that an early carcinoma of the cervix can probably be cured by a combination of radium implantation and external irradiation. Jaffe et al. have shown, however, that some of the patients with cured carcinoma die later on with fibrosis of the ureter.

CLINICAL DIAGNOSIS

Carcinoma of cervix, with involvement of the bladder, ureters and rectum.

DR. CHUTE'S DIAGNOSES

Carcinoma of the cervix, with extension to the bladder and occlusion of the ureters.

Hydronephrosis bilateral.

Hydroureter, bilateral.

ANATOMICAL DIAGNOSES

Carcinoma of cervical stump, involving the bladder, and obstructing the ureters, with metastases to the right kidney and both lungs.

Vesicovaginal fistula.

Bilateral hydronephrosis, severe on right, slight on left.

Radiation fibrosis.

Septic pulmonary infarcts, multiple.

Old postoperative supravaginal hysterectomy.

Phleboliths.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: Dr. Chute has outlined the problem very clearly; it concerned not the underlying disease but the nature of the terminal complications. At autopsy recurrent tumor was found occupying most of the pelvis. This had grown into the bladder and also into the vagina, and one complication which was not foreshadowed clearly by the symptoms was a vesicovaginal fistula. Perhaps the actual perforation did not occur until the patient had become virtually anuric, and for that reason it was not obvious. The lower ends of both ureters were completely surrounded and invaded by tumor. It was impossible to probe them from below, although working from above the probe could be forced through with considerable difficulty. The ureters above the point of

*Jaffe, H. L., Meigs, J. V., Graves, R. C. and Kickham, C. J. E. Ureteral and renal complications of carcinoma of cervix; their classification and management. *Surg., Gynec. & Obst.* 70:178-184, 1940.

obstruction were quite markedly dilated, and when a nick was made into them, urine under tension spurting out. Both kidneys showed a slight dilatation of the pelvis. The right kidney was normal in size. The left kidney weighed only 75 gm., which is more than an ordinary anatomic variation and probably means a considerable atrophy. I should therefore imagine that the obstruction had developed sooner on the left than on the right. The terminal pulmonary complication was one of multiple septic infarcts. There were also, however, a certain number of nodules of tumor in the lungs.

A PHYSICIAN: Was the mucous membrane of the rectum involved?

DR. MALLORY: No; we found no mechanical explanation for the obstipation. There were numerous adhesions within the abdomen, and one loop of ileum was firmly adherent to the dome of the bladder, a rather common complication in some of these heavily irradiated cases. The mucosa was normal and showed no signs of irradiation necrosis. There was another adhesion to the old laparotomy scar, but no kinking about either lesion. I do not believe that the patient had any actual obstruction.

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of

THE MASSACHUSETTS MEDICAL SOCIETY
and

THE NEW HAMPSHIRE MEDICAL SOCIETY

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SUBSCRIPTION TERMS: \$6.00 per year in advance, postage paid, for the United States; Canada, \$7.04 per year, Boston funds; \$8.52 per year for all foreign countries belonging to the Postal Union.

MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

ILL FARES THE LAND

CURRENT events have at last made it apparent, by the very monotony of their repetition, that in this century it is impossible for a nation to live within itself like a walled town, shut away from the outer world. The nation that tries to escape from the reality outside finds that reality comes and pounds on its gates. We are ourselves finally facing this fact, but only within a very few months have we come definitely to admit it.

The questions for which we have had to find the answers have been whether security can be bought with money or by success in barter and trade, or whether it can be purchased by the reactionary policies of appeasement. History has not only answered these questions for us in the negative, but has actually given us every reason to

doubt whether the average human being has ever had any reason to consider personal security a normal condition of life.

A great deal has been said about security in the last few years. The favored classes of this nation took economic security for granted in the lush years before 1917, and all classes anticipated it during the years of the inverted pyramid prior to 1929. After the financial debacle, it was one desideratum of living: a peaceful, strifeless security with a tight roof, oil heat, a radio by the fireplace and a policeman on the corner to keep away evil-doers.

The trouble with this security, as we are learning now, is its vulnerability. It is too dependent on peace on earth to men of good will. Everything must run smoothly to make it effective. Too many disturbances can take place to interfere with its serenity, and the only protection against them is to be equipped to handle them. When there are wolves around, the armed hunter, despite the risks of the chase, is more secure than the peaceful shepherd with his flock.

Security, of an individual or of a nation, is not a passive condition. It is the reward only of an alert, aggressive attitude, and when that spirit of aggressiveness falters and fades away, no sense of security can survive it for very long. The final protection against highwaymen does not lie in fast coach horses for escape, or in paying tribute to them, but in seizing them and dealing with them, with justice, but without mercy.

Security without effort, for the individual or the nation, is transitory and ephemeral. It is as undesirable as it is unreal. We have given ourselves over too much to the thought of security as being part of the natural condition of living. We have emphasized its importance in the life of the child. We have associated it with protective tariffs, high interest rates and iron-bound annuities, not realizing that we had completely missed its definition; it is not the accompaniment of an arrived millennium, but the reward of valor, of strength and of watchfulness.

Democracy with its institutions has of all forms of government come the closest so far to offering any material number of the earth's inhabitants the

opportunity to achieve and perhaps maintain a degree of security, but we are learning again that it is at the price of eternal vigilance. We may desire the perpetuation of what we consider certain fundamental rights of man, but they are recognized as rights only in a democracy, and we have to be willing to go forth in the defense of them. We have to risk in order to hold; we must sometimes lose in order to gain.

THE PREVENTION OF TETANUS

TETANUS does not rank high as a cause of death or of illness in ordinary times in New England, and its occasional occurrence has been regarded as more or less inevitable. This point of view is changing, and it seems possible that many cases can be prevented by prophylactic active immunization with tetanus toxoid.

Tetanus toxoid, prepared and administered in much the same way as diphtheria toxoid, produces a basic immunity and puts the specific protective mechanism of the body into such shape that it will respond rapidly when needed. In the event of subsequent injury, another injection of tetanus toxoid is followed by a rise in the patient's antitoxin titer high enough to prevent a tetanus infection. Should this injection be omitted through neglect of an apparently trifling injury, and should tetanus infection occur, the latter of itself may start the production of enough antitoxin to promote recovery or even prevent a clinically evident intoxication. Such at least is the rationale of active immunization against tetanus, and its theoretical basis is sound.

Experimental proof for this theory, at least so far as human beings are concerned, was not available until the current war produced injuries in quantity. Available data for the French army, where immunization was compulsory, and for the British army, where it has been extensively used, indicate that tetanus has been completely prevented in immunized persons. Most, if not all, of the credit for this has been ascribed to the use of toxoid.

Prophylactic administration of tetanus antitoxin, with the attendant serum reactions and sensitiza-

tion to serum, appears to be unnecessary in persons who have been actively immunized with toxoid.

The desirability of active immunization of troops seems beyond reasonable doubt. What of its use in civilian practice? Certainly those persons running more than the usual risk of exposure might well be immunized. In this group are veterinarians, hostlers, horsemen in general and farmers. Possibly children should also be placed in this category, for their risk of traumatic injuries is high. Persons already sensitive to horse serum might well consider immunization, to avoid the chance of allergic reactions following prophylactic doses of antitoxin. If the incidence of tetanus has been high in the civilian war-wounded, immunization of the general population should be considered in areas that are potential zones of attack.

The choice of an immunizing agent is still unsettled. Both fluid and alum-precipitated preparations have their advocates, and there are some advantages—without apparent disadvantages—in employing tetanus toxoid combined with diphtheria toxoid or typhoid vaccine. Reactions to tetanus toxoid are, on the whole, infrequent and mild; and their occurrence should tend to lessen as experience in manufacture and administration is increased.

Because of the present small number of cases and the cost of wholesale immunization, the prevention of tetanus with toxoid does not appear to be a problem to be dealt with by public-health officials. Practicing physicians, however, should advocate immunization, particularly for the groups mentioned above.

MEDICAL EPONYM

HENOCH'S PURPURA

Professor Eduard Heinrich Henoch (1820-1910) discussed "Ueber eine eigenthümliche Form von Purpura [A Peculiar Form of Purpura]" before the Berlin Medical Society on November 18, 1874. His paper appeared in the *Berliner klinische Wochenschrift* (11: 641-643, 1874). He had reported a single case six years previously. A portion of the translation follows:

The characteristic feature is the combination of purpura with marked intestinal symptoms. The latter manifest themselves in the form of colic, abdominal tenderness, vomiting (frequently of masses of green material) and bloody evacuations. Further, there were rheumatoid pains in all our cases, except one, including swelling of the joints in one case. Characteristic, too, was the occurrence of these symptoms in recurrent attacks at intervals of a week or more so that in the average case three to seven weeks elapsed, and in one case more than three months, before the final end of the process.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

PROPOSED CHANGES IN THE BY-LAWS

Through an oversight, the following proposed changes in the by-laws, which were approved by the Council at its meeting held on February 5, 1941, and were published in the February 27, 1941, issue of the *Journal*, were omitted from the list of proposed changes enclosed with the preliminary program recently forwarded to all members of the Society. A notice to this effect has been forwarded to each member, and a leaflet containing the additional changes will be distributed at the annual meeting of the Society.

AMENDMENT 16. Amend the first paragraph of Chapter IV, Section 1, to read:

The Council shall consist of councilors chosen by the district societies, and the president, ex-presidents, president-elect, vice-president, vice-presidents *ex officio*, secretary and treasurer of the general society, secretaries of the district societies, and the chairman of each standing committee.

AMENDMENT 17. Amend the first paragraph of Chapter IV, Section 3 to read:

The Council at its annual meeting, on nomination by the Nominating Committee and/or from the floor, shall elect by ballot officers of the Society as follows: president-elect, who shall serve as president-elect until the annual meeting of the Society next ensuing after his election and shall become president on his installation in the course of that meeting, serving thereafter as president until the next following annual meeting and the installation of his successor; a vice-president, secretary and treasurer, all of whom shall assume the duties of office at the close of the annual meeting of the Society and shall hold office until their successors have been duly elected; except only that at the annual meeting of the Society in 1941 there shall be nominated and elected a president to serve for that year.

In the absence of a president-elect, the Council, at its next annual meeting, shall upon nomination by the Nominating Committee and/or from the floor, elect a president. Councilors only shall be eligible to the offices above named. Upon nomination by the Nominating Committee, the Council shall elect by ballot a fellow to deliver an oration at the annual meeting of the Society the following year.

AMENDMENT 18. Change Chapter VI, Section 3, to read:

The President-Elect shall assist the President in the performance of his duties in such a manner as the President may direct and in so doing shall be considered to represent the President.

AMENDMENT 19. Change Sections 3, 4 and 5, Chapter VI to Sections 4, 5 and 7, respectively.

ROBERT N. NYE, *Secretary pro tempore*.

COMMITTEE ON STATE AND NATIONAL LEGISLATION

House Bill 1222, the bill to establish a separate board of registration for chiropractors was given "leave to withdraw" by the Committee on Public Health on April 15; this report was accepted by the House the next day, but will have to be accepted by the Senate, before it is finally disposed of.

HENRY C. MARBLE, *Chairman*.

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

DEATH FOLLOWING MISMANAGEMENT OF DELIVERY

A thirty-four-year-old primipara who had received no prenatal care was sent to a state institution about a week before her expected date of delivery.

The past history was entirely irrelevant. She had never had scarlet fever or kidney trouble.

Physical examination on admission was normal. The heart was not enlarged; there were no murmurs. The lungs were clear and resonant; there were no rales. The blood pressure was 130 systolic, 80 diastolic. The abdomen was the size of a full-term pregnancy, and the fetal heart was heard. There was considerable edema of both legs. The urine showed a large amount of albumin. There was no record of the patient's weight. She was put to bed and treated for mild toxemia.

Six days after entrance, labor started spontaneously. It was said that at the end of twelve hours the cervix was fully dilated. The position was a posterior vertex, and the head was thought to be in the mid-pelvis. Under ether anesthesia a high-forceps delivery was attempted, without success; another physician attempted version, which likewise failed. Following these two operative procedures, a third consultant was called to decide

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

whether a cesarean section should be performed. This was decided against because the patient was in such poor condition. She died a few hours later, undelivered.

Comment. No comment is really necessary. Although this patient had no prenatal care, her death cannot be attributed to her own neglect. There is no excuse for such obstetrics. It is only fair to say that no obstetrician saw this patient. Until the obstetrics that is done in all hospitals, including state as well as private and incorporated institutions, is adequately supervised, an occasional repetition of this disaster is unavoidable.

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning April 27.

Bristol South (Fall River Section)

Tuesday, April 29, at 4 30 p.m., at the Union Hospital, Fall River. Pediatric Case Discussions. Instructor R. Cannon Eley. Howard P. Sawyer, *Chairman*.

Hampden

Wednesday, April 30, at 4 00 p.m., at the Academy of Medicine, Professional Building, 20 Maple Street, Springfield, and at 8 00 p.m., in the Outpatient Department of the Skinner Clinic, Holyoke Hospital, Holyoke. Recent Advances in Medical Therapeutics. Instructor Charles L. Short. Alfonso A. Palermo, *Chairman*.

Worcester

Tuesday, April 29, at 8 30 p.m., in the Nurses' Home of the Milford Hospital, Milford. Infections of the Hands and Feet. Instructor William E. Browne. Joseph Ashkins, *Chairman*.

APPLICANTS FOR FELLOWSHIP

Owing to an error, the following names were omitted from the list of applicants for fellowship printed in the April 10 issue of the *Journal*.

Hampden District

McEllicott, Maurice James, Westfield State Sanatorium, Westfield.
Rush Medical College, University of Chicago, 1937.
Wayne C. Barnes, *Secretary*.

Plymouth District

Golstein, Walter, 169 West Elm Street, Brockton.
University of Berlin, 1923.
Mathews Molyneux Paul, 28 Maple Avenue, Brockton.
Middlesex University School of Medicine, 1933.
Ralph C. McLeod, *Secretary*.

DEATHS

McCarthy—Thomas H. McCarthy, M.D., of Brockton, died April 11. He was in his seventy eighth year.

Dr. McCarthy received his degree from the Harvard Medical School in 1890. He was on the surgical staff of the Brockton Hospital at the time of his death. He held memberships in the Massachusetts Medical Society and the American Medical Association.

Packard—Loring B. Packard, M.D., of Brockton, died April 12. He was in his sixty fifth year.

Born in Sharon, he attended Yale University and received his degree from Harvard Medical School in 1903. After two years at the Boston City Hospital, he became resident surgeon at the Haymarket Relief Station, Boston. In 1912 he became superintendent of the Brockton Hospital, which capacity he filled until his retirement in 1919. At the time of his death he was on the staff of the Brockton Hospital as surgeon and roentgenologist.

Dr. Packard was a member of the Massachusetts Medical Society, the American Medical Association and the New England Roentgen Ray Society.

MISCELLANY

MAINE NEWS

MAINE MEDICAL ASSOCIATION

The annual meeting of the Maine Medical Association will be held at the Marshall House, York Harbor, on June 22, 23 and 24.

The following physicians have been recently admitted to membership in the Maine Medical Association.

Everett F. Conlogue, Fairfield.
Paul A. Jones, Union.
William B. O'Sullivan, Biddeford.
L. Dean Webber, Kittery.

THAYER HOSPITAL, WATERTOWN

Staff meetings are held at the Thayer Hospital, Watertown, at 7 30 p.m., on the first second and fourth Thursdays of every month from September to May, inclusive (the Kennebec County Medical Association meets on the third Thursday of every month). In addition to clinical case studies, panel discussions and guest speakers are included in certain of the programs. Dr. Arnold P. Meiklejohn, of the Thorndike Memorial Laboratory, Boston City Hospital, will speak on "Vitamin Therapy" at the May 1 meeting. Dr. Samuel A. Levine, of Boston, will speak on "Some Important Errors in Cardiac Diagnosis" at the May 22 meeting. The profession is cordially invited to attend these meetings.

PANEL DISCUSSIONS

The following panel discussions, with the names of the chairmen, are available to the county medical societies in 1941.

Coronary Disease. Dr. E. H. Drake, Portland.
Complications of Pregnancy. Dr. R. B. Moore, Portland.
Diseases of the Liver and Bile Passages. Dr. J. Gottlieb, Lewiston.
Endocrine Dysfunction. Dr. J. Carswell, Camden.
Syphilis. Dr. O. R. Johnson, Portland.
Chemotherapy. Dr. F. T. Hill, Waterville.
Appendicitis. Dr. I. M. Webber, Portland.

NOTICES

BOSTON MEDICAL HISTORY CLUB

The next meeting of the Boston Medical History Club will take place at the Boston Medical Library, 8 Fenway, Boston, on Monday, April 28, at 8:15 p.m. Dr. Iago Galdston, secretary, Medical Information Bureau, New York Academy of Medicine, will speak on "Humanism and Public Health."

All interested persons are cordially invited to attend.

HENRY JACKSON LECTURE

The Henry Jackson Lecture for 1941, under the auspices of the New England Heart Association, will be given on Friday, May 2, at the Boston Medical Library at 8:15 p.m. Commander J. R. Poppen, M.D., Navy Department, Bureau of Aeronautics, Washington, D. C., will discuss "Cardiovascular Problems in Aviation Medicine."

Interested physicians and medical students are cordially invited to attend.

JOSEPH H. PRATT DIAGNOSTIC HOSPITAL

Bennet Street, Boston
Lecture Hall, 9-10 a.m.

MEDICAL CONFERENCE PROGRAM, MAY

Thursday, May 1—Epidemiologic Field Trip to Halifax.
Dr. J. H. Dingle.

Friday, May 2—Pancreatic Disease and Enzyme Analysis in Early Life. Drs. Sidney Farber and Charlotte Maddock.

Tuesday, May 6—Pneumoencephalography. Dr. Kurt Goldstein.

Wednesday, May 7—Urticaria. Dr. E. A. Brown.

Thursday, May 8—Hospital case presentation. Dr. S. J. Thannhauser.

Friday, May 9—Marked Hyperthyroidism. Dr. Oliver Cope.

Tuesday, May 13—Subacute Bacterial Endocarditis with Special Reference to Treatment. Dr. J. M. Faulkner.

Thursday, May 15—Some of the Effects of Flying on the Cardiovascular System. Dr. Ashton Graybiel.

Friday, May 16—Early Diagnosis of Carcinoma of the Stomach. Dr. B. B. Crohn.

Tuesday, May 20—Clinicopathological conference. Drs. C. S. Keefer and H. E. MacMahon.

Thursday, May 22—Extrarenal Azotemia. Dr. Emanuel Ginsburg.

Friday, May 23—Some Current Problems in Gastrointestinal Surgery. Dr. Richard Warren.

Tuesday, May 27—Secretin Test of Pancreatic Function. Dr. A. S. Hartwell.

Thursday, May 29—X-ray demonstration. Dr. Alice Ettinger.

On Wednesday and Saturday mornings throughout the month, with the exception of May 7, Dr. S. J. Thannhauser will give a medical clinic on hospital patients.

SUFFOLK DISTRICT MEDICAL SOCIETY

The annual meeting of the Suffolk District Medical Society will take place on Wednesday, April 30, at 8:15 p.m., at the Boston Medical Library.

PROGRAM

Short History of Eclampsia. Dr. Robert M. Green.
Symposium on Pre-eclamptic Toxemia and Eclampsia.
Drs. Burton E. Hamilton, Arthur T. Hertig, Maurice B. Strauss, George van S. Smith, Duncan E.

Reid, George C. Prather and Raymond S. T. (chairman).

There will be a business meeting at 8:00 p.m. for election of officers and the report of the society for 1940.

NEW ENGLAND OBSTETRICAL AND GYNECOLOGICAL SOCIETY

The spring meeting of the New England Obstetrical and Gynecological Society will be held in Providence, Rhode Island, on Wednesday, May 14. Registration will be held at the Providence Lying-In Hospital, 50 Main Street, Providence. Two programs will run concurrently in the morning: one beginning at 9:00 at the Providence Lying-In Hospital and consisting of inspection of hospital and a dry clinic; the other at the Rhode Island Hospital beginning at 8:00 with an operative clinic followed by a symposium on cancer and a dry clinic. Luncheon at 12:30 will be served at the two hospitals.

The afternoon program will commence at 1:30 at Providence Lying-In Hospital, with a meeting of executive committee, a symposium on hydatidiform mole and chorioepithelioma, and the presentation of papers. The general meeting of the society will follow at 4:15, with a reception and dinner at the Squantum Club at 5:30.

MIDDLESEX SOUTH DISTRICT MEDICAL SOCIETY

The annual meeting of the Middlesex South District Medical Society will be held at the Hotel Continental, Cambridge, on Wednesday, May 14.

PROGRAM

11:30 a.m. Business meeting.
12 m. Annual Oration: Middlesex South and Massachusetts medicine. Dr. Harold G. Giddings.
12:45 p.m. Luncheon.

CONSULTATION CLINICS FOR CRIPPLED CHILDREN IN MASSACHUSETTS, UNDER THE PROVISIONS OF THE SOCIAL SECURITY ACT

CLINIC	DATE	CLINIC CONSULTANT
Lowell	May 2	Albert H. Brewster
Haverhill	May 7	William T. Green
Brockton	May 8	George H. Van Gorden
Gardner	May 13	Mark H. Rogers
Worcester	May 16	John W. O'Meara
Pittsfield	May 19	Frank A. Slowick
Northampton	May 21	Garry deN. Hough, Jr.
Fall River	May 26	Eugene A. McCarthy
Hyannis	May 27	Paul L. Norton

HAMPDEN DISTRICT MEDICAL SOCIETY

The annual meeting of the Hampden District Medical Society will be held on Tuesday, April 29, at Hotel Federal, Springfield, at 4:00 p.m. Dr. H. Edward MacMahon, professor of pathology, Tufts College Medical School, will speak on "Clinical and Morphologic Findings in Bright Disease." Dinner will be served at 6:30 p.m. at the expense of the society.

ANNUAL CONCERT OF THE BOSTON DOCTORS' SYMPHONY ORCHESTRA

The Boston Doctors' Symphony Orchestra will give its second annual concert on Sunday, May 11, at 8:15 p.m.

in Jordan Hall Alexander Thiede will conduct Dr. Werner Mueller will appear as soloist.

Proceeds of the concert will be used for the establishment of a fund for a free bed in each of the following hospitals: Beth Israel Hospital, Children's Hospital, Massachusetts Eye and Ear Infirmary and Boston Dispensary. Tickets at \$1.00 may be obtained by applying to Dr. Julius Loman, Pelham Hall Hotel, Brookline (BEA 2430).

AMERICAN ASSOCIATION FOR THE STUDY OF GOITER

The next annual meeting of the American Association for the Study of Goiter will be held at the Hotel Statler, Boston, on May 12, 13 and 14. The program for the three-day meeting will consist of papers dealing with goiter and other diseases of the thyroid gland, dry clinics and demonstrations.

POSTGRADUATE COURSE IN OBSTETRICS

The Illinois State Department of Public Health and the Children's Bureau, United States Department of Labor, are sponsoring ten 4 week courses in obstetrics at the Chicago Lying in Hospital during the fiscal year 1941-1942. Only a limited number of physicians will be accepted for each course. The only cost to those taking the course is for room and board and \$25.00 (\$10.00 of which is refunded at the completion of the course). Applications and inquiries should be addressed to Postgraduate Course, Department of Obstetrics and Gynecology, 5848 Drexel Avenue, Chicago, Illinois.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, APRIL 27

MONDAY, APRIL 28

- 12:15-1:15 p.m. Clinicopathological conference Peter Bent Brigham Hospital amphitheater
- *8:15 p.m. Humanism and Public Health Or Iago Galdston Boston Medical History Club Boston Medical Library, 8 Fenway Boston

TUESDAY, APRIL 29

- *9-10 a.m. Sir Charles Bell in Modern Dress Or Leonard Carmichael Joseph H. Pratt Diagnostic Hospital
- 12:15-1:15 p.m. Clinicopathological conference Peter Bent Brigham Hospital amphitheater
- 5 p.m. Hospital Research Council Massachusetts General Hospital Ether Dome

WEDNESDAY, APRIL 30

- *9-10 a.m. Hospital case presentation Or S. J. Thannhauser Joseph H. Pratt Diagnostic Hospital
- *12 m. Clinicopathological conference Children's Hospital
- 4-8 p.m. New England Pediatric Society Children's Hospital Boston and Longwood Towers Brookline
- 8 p.m. Boston Society of Biologists Harvard Medical School Amphitheater E

THURSDAY, MAY 1

- *9-10 a.m. Epidemiologic Field Trip to Halifax Dr. J. H. Dingle Joseph H. Pratt Diagnostic Hospital

FRIDAY, MAY 2

- *9-10 a.m. Pancreatic Disease and Enzyme Analysis in Early Life Or Sidney Farber and Charlotte Maddock Joseph H. Pratt Diagnostic Hospital
- *11:15 p.m. Cardiac Problems in Aviation Medicine Dr. J. R. Poppen Henry Jackson Lecture New England Heart Association Boston Medical Library 8 Fenway Boston

SATURDAY, MAY 3

- *9-10 a.m. Hospital case presentation Or S. J. Thannhauser Joseph H. Pratt Diagnostic Hospital

*Open to the medical profession

APRIL 25—Massachusetts Society for Social Hygiene Page 708, issue of April 17

APRIL 25—Salem Tumor Clinic Page 579, issue of March 27

APRIL 26—Boston City Hospital Alumni Day Page 708, issue of April 17.

APRIL 28-30—American Academy of Physical Medicine Scientific session Page 579, issue of March 27

APRIL 30—Waltham Medical Meeting Page 708, issue of April 17

MAY 1-29—Joseph H. Pratt Diagnostic Hospital Medical Conference Program Page 752

MAY 5-9—American Association of Industrial Physicians and Surgeons and American Industrial Hygiene Association Page 484, issue of March 13

MAY 8—Penetucket Association of Physicians Page 263, issue of August 15

MAY 11—Boston Doctors Symphony Orchestra Second annual concert Page 752

MAY 12-14—American Association for the Study of Goiter Not above.

MAY 13-16—National Gastroenterological Association Hotel Commodore, New York City

MAY 14—New England Obstetrical and Gynecological Society Page 752

MAY 21-22—Massachusetts Medical Society Boston

MAY 28-JUNE 2—American Board of Obstetrics and Gynecology Page 262, issue of February 6

MAY 29-31—Medical Library Association Page 671, issue of April 10

MAY 30-31—American Heart Association Hotel Statler Cleveland

MAY 30-JUNE 2—American College of Chest Physicians Hotel Statler, Cleveland

JUNE 2-6—American Medical Association Cleveland

JUNE 22-24—Maine Medical Association Marshall House, York Harbor, Maine

OCTOBER 14-17—American Public Health Association Page 579, issue of March 27

DISTRICT MEDICAL SOCIETIES

ESSEX NORTH

MAY 7—Page 708, issue of April 17

ESSEX SOUTH

MAY 14—Relation of the Doctor to the Law Mr. Leland Powers New Ocean House Swampscott

FRANKLIN

MAY 13—This meeting will be held at 11 a.m. at the Franklin County Hospital, Greenfield

HAIRPOIN

APRIL 29—Page 752

MIDDLESEX SOUTH

MAY 14—Page 752

NORFOLK

MAY 8—Censors meeting Hotel Puritan Boston

SUFFOLK

APRIL 30—Page 752

MAY 1—Censors meeting Page 261, issue of February 6

WORCESTER NORTH

APRIL 23—Eighty second annual meeting Page 709, issue of April 17

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

Techniques of Conception Control By Robert Latou Dickinson, M.D., and Woodbridge Edwards Morris, M.D., general medical director, Birth Control Federation of America. A practical manual issued by the Birth Control Federation of America, Incorporated. 4", paper, 56 pp., with 50 illustrations and 3 tables. Baltimore: Wilkins and Wilkins Company, 1941. 50c

Atlas of Electroencephalography. By Frederic A. Gibbs, M.D.; and Erna L. Gibbs. F°, cloth, 221 pp., with 18 figures and 102 plates. Cambridge, Massachusetts: Lew A. Cummings, 1941. \$7.00.

Merchants in Medicine. By Emanuel M. Josephson, M.D. 8°, paper, 23 pp. New York: Chedney Press, 1941. \$1.50.

A Diabetic Manual: For the mutual use of doctor and patient. By Elliott P. Joslin, M.D., ScD., clinical professor of medicine emeritus, Harvard Medical School, medical director, George F. Baker Clinic, New England Deaconess Hospital, and consulting physician, Boston City Hospital. Seventh edition, thoroughly revised. 8°, cloth, 238 pp., with 53 illustrations and 24 tables. \$2.00.

Natural Resistance and Clinical Medicine. By David Perla, M.D., instructor in medicine, Columbia University College of Physicians and Surgeons; and Jessie Marmors-ton, M.D., assistant in pathology, Cornell University Medical College. 4°, cloth, 1344 pp., with 44 tables. Boston: Little, Brown and Company, 1941. \$10.00.

That None Should Die. By Frank G. Slaughter, M.D. 8°, cloth, 423 pp. New York: Doubleday, Doran and Company, Incorporated, 1941. \$2.75.

Applied Physiology. By Samson Wright, M.D., F.R.C.P., John Astor Professor of Physiology, University of London Middlesex Hospital Medical School, and examiner in physiology, University of Leeds. Seventh edition. 8°, cloth, 787 pp., with 367 illustrations. New York: Oxford University Press, 1940. \$7.00.

The Medical Clinics of North America. Vol. 25, Number 2. March, 1941: Baltimore Number. 8°, cloth, 303 pp., with 21 illustrations and 9 tables. Philadelphia: W. B. Saunders Company, 1941. \$2.67.

Studies from The Rockefeller Institute for Medical Research. Reprints, Vol. 117. 4°, paper, 606 pp., with 127 tables and 128 illustrations. New York: The Rockefeller Institute for Medical Research, 1941. \$2.00.

Science and Seizures: New light on epilepsy and migraine. By William Gordon Lennox, M.D., ScD. (hon.), assistant professor of neurology, Harvard Medical School, and visiting neurologist, Boston City Hospital. 8°, cloth, 258 pp., with 10 illustrations. New York: Harper and Brothers, 1941. \$2.00.

BOOK REVIEWS

A Textbook of Medicine. Edited by Russell L. Cecil, M.D., ScD. Fifth edition, revised and entirely reset. 8°, cloth, 1744 pp., with 173 illustrations. Philadelphia and London: W. B. Saunders Company, 1940. \$9.50.

When a textbook of medicine reaches its fifth edition it is fair to assume that its worth is established and that it may take rank with the best in American medical literature. This treatise is a summary of present-day medicine by one hundred and thirty-five American authors, each one an authority in his field. That so many participate in this work is due to the fact, in the words of the editor, "that the rapid growth of medical science during the last few years has made it almost impossible for a single individual to master the entire field." It is a fine demonstration of the high standard of internal medicine in America. Still one misses the personality of the individual master that is found in works like Osler's *Practice of Medicine*.

Introduction to Medical Biometry and Statistics. By Raymond Pearl, Sc.D., Ph.D., LL.D. Third edition, revised and enlarged. 8°, cloth, 537 pp., with 121 illustrations, and 140 tables. Philadelphia and London: W. B. Saunders Company, 1940. \$7.00.

Statisticians are familiar with the early editions of this work and will welcome this new one, which is a great improvement. For this group the volume is of great value—the chapter on sampling is a masterpiece. The preface gives the impression that the book is for beginners in this field of medicine, but actually it is too advanced for novices. The late Dr. Pearl states that he has omitted "accounts of many of the recent and more rec-ondite mathematical developments of statistical methodology," but he has included too many advanced methods for the physician attempting to obtain a rudimentary knowledge of the subject. Throughout the book are parts that would be exactly what the physician needs, and interspersed are far too advanced ideas. However, no ideal treatment of this subject is available to the physician, and this volume seems the nearest approach. The book could be of great value for the practitioner attempting statistical analysis, if he had the advice of someone with experience in the statistical field in selecting such parts of the book as he should study.

The Virus: Life's enemy. By Kenneth M. Smith, F.R.S. 12°, cloth, 176 pp., with 19 illustrations. New York: Macmillan Company, 1940. \$2.00.

The inability to obtain a visual image of the virus long delayed a direct approach to the study of these substances. However, methods were evolved that obviated many of the difficulties, and new vistas have been opened to an understanding of the nature and action of the virus. The author presents an able and concise summary of the fruits of virus research. This should prove an excellent introduction to those who are not in a position to delve into the extensive literature pertaining to these agents, a literature that embraces chemistry and botany as well as epidemiology.

That the two great enigmas of medicine, neoplasms and viruses, may be related is, indeed, intriguing, and data here presented point in that direction. Preoccupied as one may be with the chemotherapeutic achievements recently gained, one must not lose sight of the great importance of the role of the virus disease in man and his environment.

The Histamine and Insulin Treatment of Schizophrenia and Other Mental Diseases. By Horace Hill, M.R.C.P. 12°, cloth, 133 pp. Baltimore: Williams and Wilkins Company, 1940. \$1.75.

Of the various types of shock treatment used for schizophrenia, insulin has had the widest use up to recent times. Hill has added histamine to the insulin treatment and believes that the results are better than with insulin alone. In this small book, he gives case reports of 34 patients treated by this method; 12 were considered well at the end of the course of treatment, and 12 others were improved. Most of the patients suffered from schizophrenia, but a number showed signs of involutional melancholia. A detailed report on all the cases is given as an appendix to this brief monograph, and there are various references to the literature. Although this method of treatment has been largely superseded by other methods, Hill's reports will be found of interest to psychiatrists.

The New England Journal of Medicine

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VOLUME 224

MAY 1, 1941

NUMBER 18

REDUCTION OF PAIN AND OTHER UNDESIRABLE REACTIONS DUE TO PNEUMOENCEPHALOGRAPHY*

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SINCE its introduction by Dandy¹ twenty years ago, pneumoencephalography has become an accepted diagnostic procedure in the practice of neurology, neurosurgery and psychiatry. When properly performed, it results in a mortality of less than 0.3 per cent.²⁻⁴ The indications for encephalography are numerous, the contraindications few.^{2,3,6-11} Unfortunately, encephalography is an extremely painful procedure. When pain no longer functions as a defense mechanism, it becomes a pathologic process, the existence of which is unjustifiable. Furthermore, continued pain during encephalography causes marked fluctuations in respiration and intravascular pressure, and is, perhaps, productive of shock. Other accessory reactions to encephalography are hyperthermia, nausea, vomiting, aseptic meningitis and, occasionally, urinary retention and shock. Physicians who fail to follow the postencephalographic course of their patients are too often unimpressed by the necessity of reducing the subsequent reactions. Others are overly impressed and hesitate to utilize this valuable diagnostic method. Various means have been used to diminish the undesirable reactions of encephalography. It is our purpose to analyze these methods and to draw therefrom certain conclusions, which eight years' experience has shown to be of practical value.

CONTRAINDICATIONS AND PRECAUTIONS

Tumor of the posterior fossa and evidence of marked increased intracranial pressure are contraindications to encephalography. Patients with advanced hydrocephalus do not do well, as a rule. In such cases, especially in children, it is necessary

to force fluids after the procedure, to replace the relatively large volume of fluid that has been lost. Difficulties may be encountered when marked cerebral arteriosclerosis is present. Hemorrhage may be met with in marked arterial hypertension or in thin-walled intracranial aneurysms. In general, cases with brain tumor react more severely than those without tumor. Nevertheless, when proper precautions are taken, encephalography may be safely performed in any of these conditions except tumor of the posterior fossa or marked increase in intracranial pressure.

PRE-ENCEPHALOGRAPHIC CONSIDERATIONS

When apprehension is a significant factor it may be diminished by the oral administration of from 1½ to 3 gr. of Nembutal (sodium ethylmethylbutylbarbiturate, Sodium Amytal (sodium isoamylethylbarbiturate) or another suitable sedative on the night before encephalography.^{2,6,12,13} A repetition of the same dose of sedative about two hours before the procedure is occasionally necessary. To avoid the untoward results of vomiting, the previous meal should be omitted and fluids limited. Vomiting can be prevented in most cases by the subcutaneous injection of from 1/150 to 1/50 gr. of atropine sulfate, one hour before lumbar puncture. The use of the larger dose, in adults, diminishes any tendency toward laryngeal spasm, which may occur when the nonvolatile intravenous anesthetics are employed. Atropin also decreases nasopharyngeal and oral secretions, which may complicate the use of any anesthetic.

ENCEPHALOGRAPHIC CONSIDERATIONS

In co-operative subjects, lumbar puncture after local novocain infiltration is usually less difficult than in relaxed anesthetized subjects. With unco-operative subjects it is advisable to induce anesthesia before attempting the puncture.

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Analgesia

Morphine,^{2, 14} scopolamine,^{11, 13, 15, 16} chloral hydrate,^{8, 9, 12} oral Nembutal,⁶ and Amytal^{4, 7, 17} have been recommended as analgesic agents. Partial analgesia or narcosis is easier to obtain than complete anesthesia, and the patient requires less attention. On the other hand, it produces an incompletely relaxed patient, who is not infrequently unco-operative. The patient still suffers unnecessary pain and often requires further analgesia or the use of aromatic spirits of ammonia.^{2, 8} Epileptic and psychotic patients often become unmanageable under barbiturates. Morphine causes an additional respiratory strain, and is indicated only when barbiturates cannot be used. Therefore, it is our opinion that general anesthesia is preferable to partial analgesia.

Anesthesia

General anesthesia entirely relieves the pain of encephalography, contributes largely to its prevention in the postencephalographic period, prevents undue haste due to the patient's repeated complaints, and prevents struggling that tends to cause intracranial hemorrhage or to dislodge the drainage needles. On the other hand, accidents may occur if the operator is unfamiliar with the use of the anesthetic employed. Some type of support is necessary because of the relaxation of the patient—several such supports have been described.^{12, 18-21} The constant attention of the anesthetist is necessary for the proper induction and maintenance of the anesthesia, especially when the intravenous route is used. Nevertheless, the advantages may be said to outweigh the disadvantages. However, the choice of anesthetic is of great importance in obtaining satisfactory results.

Inhalation anesthesia. Ether,^{3, 22-25} ethyl chloride²⁶ and nitrous oxide²⁷ have been recommended for inhalation anesthesia. All these gases increase arterial, venous and cerebrospinal-fluid pressures to a marked degree and in a fluctuant fashion. These increases interfere with any simultaneous-replacement method, prevent the use of automatic methods¹³ and predispose to intracranial hemorrhage, cerebral edema and herniation of the medulla. Vomiting is not infrequent, and respiratory complications may occur. A constant level of anesthesia is difficult to maintain, and the postencephalographic period is apt to be stormy. For these reasons, it is advisable to use inhalation anesthetics in encephalography only as a brief induction to other analgesic methods.²²

Rectal anesthesia. Avertin (tribromethanol in amylene hydrate) has been recommended for this purpose.^{25, 28, 29} After instillation, the oper-

ator has very little control over the depth of anesthesia. Therefore, the tendency is to give too little, with the result that the patient emerges before completion of encephalography, making necessary to use supplementary inhalation anesthesia. Emergence usually occurs just as roentgenography is attempted, with the result that the films are spoiled by movement of the patient. Furthermore, because the patient is in the sitting position, the anesthetic fluid is often expelled during the encephalographic procedure. For these reasons, and others enumerated by Sise,³⁰ most clinics have justifiably abandoned the use of rectal anesthesia for encephalography, except in children in whom intravenous anesthesia may be impractical or dangerous.

Intravenous anesthesia. This method has been used, in recent years, with increasing frequency. Sodium Amytal,^{14, 28} Nembutal,^{13, 28, 29} Evipal Sodium (sodium methylcyclohexenylmethylbarbiturate)^{29, 31, 32} and paraldehyde^{33, 34} have been used. In the last few years, several clinics have used Pentothal Sodium (sodium ethylmethylbutylthiobarbiturate) extensively. Our experience with the last drug has led us to believe that, with proper precautions, it is the best available anesthetic for pneumoencephalography, and we are in complete accord with Nicholson and Sise,³² who have recently reported excellent results in 177 cases. Contraindications to its use include any condition that may encroach on the airways, gross hepatic disease, severe anemia, severe renal disease, extreme debility and cardiac decompensation. These, however, are contraindications to encephalography itself. Although not recommended in children under seven years of age, it has been used successfully in an occasional case. Rectal Avertin is preferable in patients under seven. In persons with low blood pressure, the introduction of gas into the cranium is usually sufficient to re-elevate the pressure. Respiratory depression or laryngeal spasm occasionally occurs. Preoperative administration of from 1/150 to 1/50 gr. of atropine sulfate is effective in preventing laryngeal spasm. Infrequently, it is necessary to keep the airways open by catheterization. Ten per cent carbon dioxide with oxygen should be kept at hand but rarely needs to be utilized. One or two cubic centimeters of 25 per cent Coramine (pyridine-beta-carboxylic acid diethylamide) intravenously will rapidly counteract the effects of Pentothal Sodium, if necessary. In our experience the most important factor in the use of Pentothal Sodium is the maintenance of a slow, almost continuous, intravenous administration. Untoward results are rare, and are almost invariably due to rapid injection. A dangerous dose of these

drugs is dependent not so much on the total amount as on the rate of injection.²⁰

The following method is recommended:

From one to one and a half hours after administration of 1/150 to 1/50 gr. of atropine sulfate, the patient is placed erect in the chair for cephalography. Several arterial pressure determinations are made, the elbow is splinted in extension and venipuncture is performed at the brachial vein. A 5 per cent solution of Pentothal Sodium in sterile normal saline solution is then slowly introduced by almost imperceptible movement of the plunger of a 20-cc. syringe. The rate is maintained or lessened according to the depth of anesthesia. Injection is continued during the replacement of cerebrospinal fluid, and the needle withdrawn just before roentgenography. Observations are occasionally made of the arterial tension, and the mouth and neck are watched to prevent airway obstruction.

This method results in a pleasant induction and a uniform maintenance of a relaxed anesthetic state. Complete relaxation is obtained during the subsequent roentgenography, which immediately follows replacement of the cerebrospinal fluid.²² No subsequent analgesia is needed for from four to twelve hours after the procedure. The cerebrospinal-fluid pressure is unaltered, and the arterial tension is apparently unaffected. Respiratory depression has been rare in our experience. Therefore, although the use of Evipal or paraldehyde deserves further consideration, at present Pentothal Sodium seems to be the most effective means of obtaining adequate anesthesia during pneumoencephalography.

Type of Gas Used

Filtered and unfiltered air, carbon dioxide, nitrogen and helium have been used to replace the cerebrospinal fluid.²⁵ Ethyl chloride, divinyl chloride, vinyl chloride, acetylene, cyclopropane and ether have been used in animals;²⁶ nitrous oxide and ethylene in human beings.²² Freon (dichlorodifluoromethane) has been used by one of us.²⁷ Many clinics use oxygen, but most continue to utilize room air. Of these gases, unfiltered room air is used most frequently but causes the severest reactions; filtered air causes some diminution of the reaction; helium and oxygen are said to be less irritating than air; nitrous oxide is better than oxygen, and according to the results in over 600 cases, ethylene is least irritant.²² The remaining gases are either too dangerous, or not sufficiently better than air, to warrant consideration.

Aird²² has used pure ethylene to replace the cerebrospinal fluid in over 600 cases, with excellent roentgenographic results and a marked decrease in the accessory effects of encephalography. Although ethylene is highly explosive when mixed with air, it is not explosive when maintained in the pure form in a closed system. There have

been no untoward results as yet from the use of this gas. The use of such an anesthetic gas does not, however, render anesthesia (Avertin fluid) unnecessary, although in children an induction anesthesia of ether is sufficient. The real value of ethylene is in reduction of postencephalographic reactions. Because of the fear of explosion, very few workers have used this method. Aird's results suggest that such fear may be unfounded.

It may be said that although, because of inertia and convenience, air continues to be the gas most frequently used in encephalography, other gases lessen the reactions afterward and diminish them somewhat during the procedure. Oxygen is preferable to air from this point of view, and if the fear of explosion can be overcome, ethylene is perhaps the gas of choice.*

Amount of Gas Used

The reaction to encephalography varies directly with the amount of gas used.^{2, 38} The use of small volumes in the so-called "ventricular repérage" results in a minimum of discomfort, some patients being up and about within several hours after injection.³⁹ On the other hand, injection of small amounts of air is in most cases inadequate for the diagnosis of more than the most obvious intracranial masses or gross ventricular enlargement.²³ After the introduction of 100 cc. of gas, additional replacement causes little change in the patient's immediate reactions. Additional gas does, however, prolong the subsequent discomfort. It may be said, therefore, that even though less gas diminishes the subject's reactions, it is necessary in all but a few cases to replace completely the cerebrospinal fluid with whatever amount of gas may be necessary.

Method of Cerebrospinal-Fluid Replacement

Numerous observations have demonstrated that the two-needle, simultaneous method of replacing cerebrospinal fluid by gas diminishes the patient's reactions during and subsequent to encephalography.^{23, 38} Several types of apparatus have been described that render replacement more or less automatic.^{12, 40-43} To avoid mechanical irritation of the brain, which, after replacement of cerebrospinal fluid, is lying in a "dry box," and to avoid undue tension on the meninges and on the vessels at the vertex, a minimum of manipulation should be maintained. Slow, continuous anteroflexion and posteroflexion of the head is sufficient for adequate ventricular replacement. Transportation

*It should be emphasized that when readily absorbable gases are used, such as oxygen or to a greater degree ethylene, the roentgenologic technique must be accelerated accordingly.

and handling of the patient should be at a minimum.

POSTENCEPHALOGRAPHIC CONSIDERATIONS

As has been noted, anesthesia with intravenous Pentothal Sodium diminishes the sequelae of encephalography. The use of ethylene to replace the cerebrospinal fluid exerts most of its effect in diminishing postencephalographic reactions. Avoidance of unnecessary cranial manipulation tends to decrease subsequent ill effects, and the use of the simultaneous-replacement method does likewise.

If shock occurs, the use of Coramine, caffeine sodium benzoate and warmth is usually sufficient therapy. It has been found unnecessary to elevate the foot of the bed. Only in rare cases has it been necessary to administer clysis to adults. In children, fluids are sometimes useful. In children with hydrocephalus, it is essential to administer fluids at once because of the dehydration that occurs when the body attempts to restore the relatively immense volume of cerebrospinal fluid that has been replaced by gas. In adults with hydrocephalus, fluids are helpful but not essential. Lumbar puncture after encephalography usually reveals a lowered rather than an increased intracranial pressure and is therefore of no value except in rare cases of increased pressure due to subsequent edema or hemorrhage.⁴⁴ In every case it is advisable to observe the temperature, respiration, arterial pressure, pulse pressure and pulse rate carefully for twenty-four hours after encephalography. A wet icecap is helpful if applied immediately on return to the ward. Codeine and acetyl salicylates may be given when necessary. Three grains of Nembutal by mouth is helpful. Morphine is to be avoided.

If the patient is allowed to breathe 95 per cent oxygen for two or three hours after encephalography, the intracranial gas is rapidly removed, and the subsequent course is greatly improved.⁴⁵ The oxygen can be more readily administered through a Boothby respirator mask than by the apparatus described by Schwab, Fine and Mixer.⁴⁶ Seven to eight liters of 100 per cent oxygen are delivered per minute.

After all reaction to encephalography has disappeared, the patient may complain of a postlumbar-puncture headache that occurs only in the erect position. This can be relieved by the intravenous injection of $7\frac{1}{2}$ gr. of caffeine sodium benzoate from one to three times a day or by the resumption of recumbency.

SUMMARY

So that pneumoencephalography may be available for use in all cases in which it promises to

be of value, every effort should be made to reduce the dangers, pain and other untoward reactions. This may be accomplished to a large degree by proper consideration of the contraindications to encephalography; the liberal use of preliminary sedation, for which Nembutal has been found most useful; prophylactic injection of from 1/150 to 1/50 gr. of atropine sulfate; the use of an effective intravenous anesthetic, such as Pentothal Sodium; the use of a suitable gas, such as air, oxygen or possibly ethylene; simultaneous replacement of the cerebrospinal fluid by gas; avoidance of undue manipulation of the patient; careful postencephalographic observation and the use of analgesics and sedatives, when necessary; the use of fluids and shock therapy, when indicated; and the inhalation of 95 per cent oxygen, when necessary.

REFERENCES

1. Dandy, W. E. Röntgenography of the brain after the injection of air into the spinal canal. *Ann. Surg.* 70:397-403, 1919.
2. Davidoff, L. M. and Dyke, C. G. *The Normal Encephalogram*. 224 pp. Philadelphia: Lea & Febiger, 1937.
3. Dixon, H. H. and Ebaugh, F. G. Encephalography: anatomic and clinical correlations. *Arch. Neurol. & Psychiat.* 28:1326-1337, 1932.
4. Grant, F. C. Ventriculography and encephalography: their value in the localization and treatment of intracranial lesions. *Arch. Neurol. & Psychiat.* 27:1310-1341, 1932.
5. Bingel, Z. Zur Technik der intralumbalen Lufteinblasung, insbesondere zum Zwecke der "Enzephalographie." *Deutsche med. Wochenschr.* 47:1492, 1921.
6. Branch, C. D., Cutler, E. C. and Zollinger, R. Experiences with encephalography. *New Eng. J. Med.* 207:963-971, 1932.
7. Goodhart, S. P., Balser, B. H. and Bleher, I. Encephalographic studies in cases of extrapyramidal disease. *Arch. Neurol. & Psychiat.* 35:249-252, 1936.
8. Pancoast, H. K. and Fay, T. Encephalography: roentgenological and clinical considerations for its use. *Am. J. Roentgenol.* 21:141-147, 1929.
9. Pendergrass, E. P. The value of and indications for encephalography and ventriculography, with discussion of the technic. *S. Clin. North America* 10:1461-1475, 1930.
10. Penfield, W. G. Cerebral pneumography: its dangers and uses. *Arch. Neurol. & Psychiat.* 13:580-591, 1925.
11. Waggoner, R. W. Encephalography. *Am. J. M. Sc.* 174:459-466, 1927.
12. Camp, C. D. and Waggoner, R. W. The technic of encephalography. *Arch. Neurol. & Psychiat.* 25:128-136, 1931.
13. von Storch, T. J. C. On the technique of encephalography: with special reference to the use of apparatus. *Am. J. Roentgenol.* 35:78-92, 1935.
14. Crothers, B., Vogt, E. C. and Eley, R. C. Encephalography in cases with fixed lesions of the brain. *Am. J. Dis. Child.* 40:227-246, 1930.
15. Friedman, E. D., Snow, W. and Kasanin, J. Experiences with encephalography via the lumbar route. *Arch. Neurol. & Psychiat.* 19:762-775, 1928.
16. Notkin, J. Encephalographic studies in cryptogenic epilepsy. *Arch. Neurol. & Psychiat.* 26:115-130, 1931.
17. Moore, M. T., Nathan, D., Elliott, A. R. and Laubach, C. Encephalographic studies in manic-depressive psychosis: report of thirty-eight cases. *Arch. Neurol. & Psychiat.* 31:1194-1204, 1934.
18. Bradley, C. An encephalography chair for children. *J. Pediatr.* 7:512-515, 1935.
19. Epstein, S. H. and Hanflig, S. S. A new apparatus for encephalography. *Am. J. Roentgenol.* 29:698-703, 1933.
20. Epstein, S. H. and von Storch, T. J. C. An improved apparatus for encephalography adaptable to ventriculography. *Am. J. Roentgenol.* 34:451-456, 1935.
21. Schreiber, F. Equipment for encephalography. *Am. J. Roentgenol.* 23:427-429, 1930.
22. Aird, R. B. Encephalography with anesthetic gases. *Arch. Surg.* 34:853-867, 1937. Also, personal communication.
23. Carpenter, E. R. Encephalography: lumbar puncture and trephine methods. *Am. J. M. Sc.* 173:333-342, 1927.
24. Craig, W.: discussion of Daniels, L. E. Posttraumatic narcolepsy with apparent recovery following encephalography. *Proc. Staff Meet., Mayo Clinic* 7:489-492, 1932.
25. Eley, R. C. and Vogt, E. C. Encephalography in children: further observations in children with fixed lesions of the brain. *Am. J. Roentgenol.* 27:686-696, 1932.
26. Foerster, O. Encephalographische Erfahrungen. *Ztschr. f. d. ges. Neurol. u. Psychiat.* 94:512-584, 1925.
27. Waggoner, R. W. and Himler, L. E. Encephalography under nitrous oxide anesthesia. *Am. J. Roentgenol.* 31:784-786, 1934.
28. Solomon, H. C. and Epstein, S. H. Encephalography under cyclopropane produced by nonvolatile anesthetics: a note on the technic. *J. A. M. A.* 98:1794-1796, 1932.
29. Tuohy, E. B. Anesthetic procedures used at the Mayo Clinic. *II For neurologic surgery. Proc. Staff Meet., Mayo Clin.* 13:377, 1938.

- 30 Sise, L. F. Clinical evaluation of some nonvolatile anesthetic drugs *New Eng J Med* 219 349 354 1938
- 31 Hudson H. W., Jr. On administrations of evipal soluble to infants and children *New Eng J Med* 216 915 918 1937
- 32 Nicholson M. J. and Sise, L. F. Pentothal sodium anesthesia for encephalography *New Eng J Med* 222 994 996 1940
- 33 Kott J., Roth G. B. and Ryon W. A. Idiosyncrasy to paraldehyde *J. A. M. A.* 110 2145 2148 1938
- 34 Robinson L. J. Intravenous paraldehyde narcosis for pneumoencephalography *New Eng J Med* 219 114 117, 1938
- 35 Liberson F. The use of various gases in encephalography: a summary of two hundred and ten cases using the simultaneous displacement apparatus *Am J M Sc* 185 475 484 1933
- 36 Aird R. B. Experimental encephalography with anesthetic gases *Arch Surg* 32:193 217 1936
- 37 von Storch T. J. C. unpublished data
- 38 Schwab R. S. and von Storch T. J. C. Alterations of the cerebrospinal fluid subsequent to pneumoencephalography *New Eng J Med* 217:21 24 1937
- 39 Laruelle L. Le repérage des ventricules cérébraux par un procédé de routine *Presse med* 39 1889 1891, 1931
- 40 Holt W. L. Jr. and Schwab R. S. An easily made apparatus for use in closed system pneumoencephalography *Arch Neurol & Psychiat* 41 1021 1077 1939
- 41 Liberson F. Apparatus for a multaneous displacement *Arch Neurol & Psychiat* 12 300 304 1924
- 42 Piercy H. D. An apparatus for the simultaneous displacement of spinal fluid and the injection of air for encephalography *Arch Neurol & Psychiat* 33 1075 1077 1935
- 43 Walker A. E. Encephalography in children *Am J Roentgenol* 32 437 456 1934
- 44 von Storch T. J. C. The spinal fluid dynamics during encephalography *New Eng J Med* 211 773 1934
- 45 Schwab R. S. Fine J. and Mixer W. J. The reduction of post encephalographic symptoms by the inhalation of 95 per cent oxygen *Arch Neurol & Psychiat* 37 121 128 1937

THE ESTIMATION OF OPERATIVE RISK IN PATIENTS WITH CANCER*

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THE operative mortality in a hospital limited to the treatment of cancer is necessarily high, but a preliminary review of a few hundred cases gave the impression that a lower mortality could be obtained by limiting operations to selected patients without obesity, malnutrition, hypertension or a history suggesting cardiac disease. This study was undertaken to prove whether or not this thesis was correct. The material consisted of 2445 cases subjected to major operations at the Massachusetts state cancer hospitals at Pondville (1927 to 1939) and at Westfield (1937 to 1939).

Operative mortality is a term lacking in precise definition. In this study we have used the criteria of Warren,¹ who considered that patients dying within one month after operation were operative deaths, provided the death was not due to the natural course of the condition for which the operation was done. According to this definition, a patient dying of pneumonia or heart failure, obviously precipitated by the operation, is listed as an operative death. This is true of sepsis having a causal relation to the operative procedure. It has also seemed justifiable to list as an operative death an occasional patient who survived the arbitrary one month, but who pursued a progressively downhill course with one postoperative complication after another and finally died of the complications and not of the original disease that necessitated the operation. Because a patient who has developed fatal lung abscesses after resection of the rectum is still breathing, although moribund, thirty days later, it does not seem rea-

sonable to absolve the operation from responsibility for the death. On the other hand, patients were not so listed who, after a palliative operation, died of sepsis due to the original lesion and antedating the surgical procedure.

Although a variety of fatal lesions were often present at the time of death, some were listed by the pathologist as the "immediate cause of death" in the autopsied cases, which comprised 58.5 per cent of the fatalities. In the cases not subjected to autopsy it was necessary to rely on a careful appraisal of the data in the histories. For example, a patient with obvious sepsis was

TABLE 1 Operative Mortality Subdivided by the Age of the Patient

AGE	NO OF CASES	NO OF DEATHS	PER CENT MORTALITY
Under 40 years	270	11	4.1
40-49	457	33	7.1
50-59	676	84	13.4
60-69	713	173	24.3
70 and over	368	85	23.1
Totals	2444*	386	

*In 1 case the age was unknown.

not listed as dying of heart failure just because his heart finally stopped beating. On the other hand, the classic clinical picture of congestive heart failure, although it might have been precipitated by postoperative sepsis, was listed as the cause of death if the patient succumbed under these circumstances. In the hope of eliminating inconsistencies resulting from appraisal by different people, one of us (A. S. J.) undertook the entire task of evaluating the clinical data, and the other (H. L. L.) assumed the responsibility for the statistical computations.

It is well recognized that increasing age produces an increase in surgical mortality. Table 1

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shows the operative mortality according to age groups. Mortality increases progressively up to the age of sixty; from then on it is practically stationary.

A history of cardiac disability has been considered by many observers to increase operative risk. In this group were listed all patients who gave a history of exertion dyspnea, cyanosis, angina or edema that could be ascribed to heart disease. Dyspnea or cyanosis due obviously to a pulmonary lesion or edema due to hypoproteinemia or varicose veins was naturally excluded. The patient's history was given more consideration than the physical or laboratory examinations for two reasons. First, as Marvin² has emphasized, the history is more important than the physical examination in determining the patient's ability to withstand anesthesia and operation; and Sprague³ has pointed out that "the ability of the patient to carry on his daily activity without symptoms usually tells more about his myocardial power than can be discovered on examination of the heart." Secondly, it will be some time before electrocardiographic, x-ray and other laboratory procedures are available in every case subjected to major surgery.

A patient was not considered hypertensive unless a systolic pressure of 160 or more was accompanied by a diastolic pressure of 100 or more. These levels were deliberately made higher than life-insurance norms in an attempt to exclude transient elevations due to emotional disturbances. Furthermore, if only one or two readings were above this level and the majority were lower, the patient was not classed as hypertensive.

The classification of the patient's nutritional state may not receive general acceptance. Lack of data made it impossible to classify each patient in terms of percentage above or below norms for a given age, height and sex. They were therefore listed according to the examining physician's appraisal, which was either "obese," "well-developed and well-nourished" or "poorly nourished." That this inexact classification of obese or malnourished implied a significant departure from normal may be inferred from the fact that this required a detailed note in longhand in contrast to the check marks that were used on a printed form when the patient appeared normally nourished.

The duration of the operation was likewise found to influence surgical mortality, probably because duration is likely to parallel the severity of the procedure.

In Table 2 the operative mortality for all cases is contrasted with that for the various groups. The mortality for long operations (two hours or

more) was very high (46.7 per cent), in contrast to 12.1 per cent for all operations under two hours; and those patients with a cardiac history, malnutrition or an age of sixty or over had a considerably higher mortality rate than did the total population of the study. The mortality of the

TABLE 2. Operative Mortality.

CLASSIFICATION	NO. OF CASES	MORTALITY %
Total cases	2445	15.8
Obesity	266	7.9
Malnutrition	565	25.3
Old age (over 60)	1081	23.8
Hypertension	347	16.4
Cardiac history	346	24.6
Long operation (over 2 hours)	244	46.7
Short operation (under 2 hours)	2201	12.1

obese group was below that for the total population, and the rate of the hypertensive group was practically the same as that of the total.

With the realization that combinations of these variables were common and that the true picture might easily be masked because of the interrelation between them, the variables were subjected to partial association. For example, a group of patients might all have cardiac disease and hypertension and be aged. The problem was to determine whether all three variables contributed to the high operative mortality of the group, or whether only one was responsible, the seeming relation of the other two being simply due to the combined presence of all three variables. It was recognized, moreover, that differences in mortality inherent in the type of operation must be taken into account in these calculations. The analysis of plural variables, in which the data are grouped as present or absent, requires working with partial association, which is the effort to eliminate the fallacy of mixed classification by using partial universes.

Subuniverses were constructed, and the mean of the combination of all the universes for a given variable was compared with its standard deviation. The criterion of measurement of significance was 2.6, *p* equaling 0.01. The results follow: obesity -0.8; malnutrition 1.97; old age (over sixty years) 3.5; hypertension 1.17; cardiac history 1.86; long operation (over two hours) 4.0. Only the figures for the aged and for length of operation are significant. The clinician who may have been frightened off by the statistical method of approach is referred to Table 3 in which the operative mortality is given for each pure subgroup. All patients in any given group in this table were afflicted with only one of the presumable contraindications to operation. The conclusions to be drawn from

contrasting these mortality rates with the total mortality of 15.8 per cent are substantially the same as those already reached by the method of partial association.

This clearly indicates that the only variables of importance in this selection of cases were the prolonged operation and the age of the patient. It is

TABLE 3. *Relation Between Operative Mortality and "Pure" Presumable Contraindications to Surgery.*

CO-CONTRADICTION	NO. OF CASES	MORTALITY %
Obesity alone	113	2.7
Malnutrition alone	210	14.8
Old age (over 60 years) alone	429	21.7
Hypertension alone	80	11.2
Cardiac history alone	59	15.3
Long operation (over 2 hours) alone	62	27.4

impossible to postulate from this study whether similar results would be obtained in another series, since the choice of patients might easily vary.

Table 4 lists the immediate causes of death in their order of importance for the total 386 deaths.

TABLE 4. *Causes of Postoperative Deaths.*

CAUSE OF DEATH	TOTAL CASES (386)	AUTOPSIED CASES (216) %
Sepsis	35.8	40.3
Pneumonia	26.9	26.1
Cardiac failure	11.1	11.1
Pulmonary embolism	7.3	7.5
Hemorrhage	4.9	5.7
Renal failure	3.1	3.1
Surgical shock	4.9	4.9
All other causes	6.0	1.3

Warren¹ in a study of 252 postoperative deaths coming to autopsy found the immediate cause of death to be in order of their incidence: sepsis,

TABLE 5. *Causes of Postoperative Death Subdivided According to Criteria of Operability.*

TOTAL DEATHS	CAUSES OF DEATH					ALL OTHERS
	SEPSIS	PNEUMONIA	HEART FAILURE	PULMONARY EMBOLISM		
Obesity alone	3	—	—	1		1
Malnutrition alone	31	12	10	2		7
Old age (over 60 years) alone	93	37	26	10	8	12
Hypertension alone	9	5	—	1	1	2
Cardiac history alone	9	4	2	—	—	3
Long operation (over 2 hours) alone	17	7	6	—	—	4

pulmonary embolism, pneumonia and cardiac failure.

Table 5 shows the distribution of these causes among our patients having to their discredit only malnutrition, hypertension, cardiac history, old age, long duration of operation, or obesity. As might be expected, the same approximate relation exists for the chief causes of death: sepsis, pneumonia, heart failure and pulmonary em-

bolism. The low incidence of heart failure among the "pure" cardiac patients and "pure" hypertensive patients coincides with the observations of Butler, Feeney and Levine⁴ that, even among patients with heart disease, heart failure was seldom the cause of postoperative death. Brumm and Willius⁵ also found only 4.5 per cent cardiac deaths postoperatively among 257 patients with severe coronary disease. These observations must be contrasted with Sprague's³ report of heart failure's responsibility for 50 per cent of the postoperative deaths in a group of 170 cardiac patients.

The mortality for different types of anesthesia is listed in Table 6. One must be cautious about

TABLE 6. *Mortality with Different Types of Anesthesia.*

ANESTHESIA	NO. OF CASES	NO. OF DEATHS	MORTALITY %
General	1339	148	11.1
Local	524	102	19.5
Spinal	339	75	22.1
Mixed (more than one)	227	58	25.6
Totals	2429*	383	

*In 16 cases there was no record of the anesthesia.

drawing conclusions from these figures, since so-called "safe" anesthetics like novocain were often used in emergency or palliative operations when the patient was in a very poor condition. The strikingly higher mortality in cases in which more than one anesthetic was employed was probably due to difficulties inherent in the procedure, which increased the length of the operation so that spinal anesthesia had to be supplemented with general or with local anesthesia. The importance of the duration of the operation has already been discussed. Because a given operation usually postulated a certain type of anesthesia, it was not possible to com-

pare the hazard of different types of anesthesia in a particular operation in which the expected mortality was well established.

Since the age of the patient and the duration of the operation appear to be the most important factors in determining operative mortality, the interrelation of these factors demands examination. With an operation that lasted longer than two hours, the mortality among patients over sixty

years of age was 1.7 times as great as that among those under sixty. Among those with an operation of less than two hours' duration, the mortality rate of patients over sixty was 2.6 times as great as that of those under sixty. A comparison of the over-sixty group with over two hours' operations with the over-sixty group with less than two hours' operations shows the former to be 2.9 times as great. It appears that both variables are of great significance in operative mortality, and the long operation is probably the more important of the two.

SUMMARY AND CONCLUSIONS

In the work done at the Pondville and Westfield cancer hospitals, such variables as obesity, malnu-

trition, cardiac history and hypertension are apparently of little value in determining operative mortality; the age of the patient and the length of the operation are of considerable importance, with the latter perhaps the more significant of the two.

REFERENCES

1. Warren, S. The heart in postoperative deaths. *New Eng. J. Med.* 218:655, 1938.
2. Marvin, H. M. The heart during anesthesia and operative procedures. *New Eng. J. Med.* 199:547-551, 1928.
3. Sprague, H. B. The heart in surgery. *Surg., Gynec. & Obst.* 40:34-51, 1929.
4. Butler, S., Feeney, N. and Levine, S. A. The patient with heart disease as a surgical risk. *J. A. M. A.* 95:85-91, 1930.
5. Brumm, H. J. and Willis, F. A. Surgical risk in patients with coronary disease. *J. A. M. A.* 112:2377-2380, 1939.

THE PROTHROMBIN LEVEL IN EARLY INFANCY*

Its Relation to Hemorrhage and Other Neonatal Disturbances

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WHIPPLE¹ observed over twenty-five years ago that hemorrhagic disease of the newborn might be associated with an extremely low plasma prothrombin. Brinkhous et al.² using a method³ of prothrombin titration much more precise than any previously employed, demonstrated that the majority of newborn infants had moderately low prothrombin titers. Moreover they found that one infant, suffering from hemorrhage, had only 5 per cent of the normal adult level. The present report is the result of an attempt to define further the relation between neonatal hemorrhage and plasma-prothrombin deficiency.

MATERIAL AND METHODS

Prothrombin determinations were made on bloods obtained from 27 infants at the Infants' Hospital, the Children's Hospital and the Boston Lying-in Hospital.‡ Blood drawn from the internal or external jugular vein was added to about one tenth of its volume of 3 per cent sodium citrate in a graduated tube, and centrifuged for twenty to thirty minutes at 2000 revolutions per minute; the hematocrit was noted, and the plasma drawn off. The method of prothrombin titration was modified slightly from that of Quick.⁴ Plasma in

0.5-cc. amounts was placed in clean test tubes in a water bath at 37°C. To each 0.5 cc. of plasma was added enough 0.9 per cent sodium chloride solution to give a final volume of 1 cc. after the further addition of 0.2 cc. of human placental coagulant⁵ and approximately 0.05 cc. of 2.5 per cent calcium chloride solution. The prothrombin time was taken as the interval between the addition of calcium chloride and the gelation of the contents of the tube. The optimum amount of calcium chloride to be added was determined for each plasma, since it was found, in agreement with others,^{6,7} that unless this precaution was observed distorted prothrombin times might be obtained. Human placental extract (freshly prepared each week) was employed rather than animal tissue, since it gave a longer prothrombin time, which could be measured with greater accuracy. Citrate was preferred to oxalate, since it forms no precipitate on the addition of calcium ions.

The empirical correlation between prothrombin time and plasma-prothrombin concentration was determined by testing serial dilutions of normal plasma with prothrombin-free plasma. Plasma was rendered prothrombin free by absorption with alumina⁸ or by repeated passage through a Seitz filter.⁹ The values obtained in several such test runs are presented in Table 1, in the form of the ratio of the clotting time of the sample with diminished prothrombin to that of the normal control. The values presented differ somewhat from those described in the earlier reports on the subject.^{1,10}

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§Through the courtesy of Dr. F. C. Irving and the staff of the Boston Lying-in Hospital.

but correspond closely to those published by Quick¹¹ in 1938

Estimates of plasma prothrombin were reported in terms of the percentage of the adult normal, to the nearest 5 per cent, except that values from 70 to 100 per cent were entered as "70+," accurate determinations in these ranges being unreliable unless a more refined method is employed. It was found impossible to establish with certainty a critical level of plasma prothrombin, below which bleeding might be regularly expected; in various reports on this subject the "critical level" is given

infant was first seen at the Infant's Hospital when nineteen days old. Early neonatal data could not be obtained, but a tentative diagnosis of erythroblastosis was made. Dam, Tage-Hansen and Plum¹⁷ have recently published the finding of a very low plasma prothrombin titer in this condition.

The extreme and average prothrombin levels, average birth weights and duration of labor for

TABLE 3 Correlation of Condition of Infants with Plasma Prothrombin Levels, Average Birth Weight and Average Duration of Labor.

CONDITION OF INFANT	NO OF CASES	PROTHROMBIN LEVELS		AVERAGE BIRTH WEIGHT	AVERAGE DURATION OF LABOR
		EX- TREMES %	AVER- AGE ACR	lb. oz.	hr. min.
Apparently well	6	20-70+	49	7 5	8 10
Hemorrhage	12	5-70+	27	8	13 50
Intracranial injury	11	5-70+	29	7 14	13 35
Vomiting	2	5-15	—	8 9	—

TABLE 1 Prothrombin Concentration and Prothrombin Time Experimental values obtained with mixtures of normal plasma and prothrombin free plasma, expressed as the ratio of the prothrombin time obtained with diminished prothrombin concentration to that obtained with 100 per cent prothrombin concentration

PROTHROMBIN CONCENTRATION %	TEST I* 5 53	TEST II† 7 26-39	TEST III‡ 7 26 39	TEST IV§ 9 28 39
90	1 04 1	—	—	—
80	1 06 1	1 00 1	—	1 09 1
70	1 10 1	—	—	—
60	1 18 1	1 21 1	1 26 1	1 24 1
50	1 28 1	—	—	—
40	1 45 1	1 53 1	1 52 1	1 50 1
30	1 65 1	—	—	—
20	1 95 1	2 05 1	1 96 1	1 94 1
10	3 00 1	—	—	—

*Cow plasma clotted with bovine brain extract

†Human plasma clotted with placental extract

‡Same plasma as in Test II clotted with an old partly deteriorated preparation of placental extract. Note that deterioration of placental extract did not significantly alter the ratio of prothrombin time to prothrombin concentration

as 20 per cent,¹² 13 35 per cent,¹⁴ 30 to 50 per cent¹⁵ and 50 per cent.¹⁶ In the absence of any general agreement on this point, the level of 30 per cent was tentatively selected as being most consistent with the available findings

RESULTS

Thirty-nine blood samples from 27 infants less than five weeks old were titrated; the data are presented in Table 2. All specimens were obtained from infants under special observation, and hence the data do not represent a cross section of normal infancy in this age group. Neither in infants nor mothers received vitamin K during this study. In Cases 1 to 6 the patients were apparently healthy infants. In Case 7 the child had a colon bacillus septicemia from which he recovered. Cases 8 to 19 included 12 patients manifesting signs of hemorrhage other than intracranial bleeding alone.

Eleven infants (Cases 12, 13, 15, 16 and 21 to 27) were diagnosed as having some intracranial injury (neonatal asphyxia or intracranial bleeding). The patients in Cases 18 and 20 vomited all feedings from birth for about one week. In Case 19 the

each of the above groups are summarized in Table 3

DISCUSSION

The above data indicate a wide variation in the plasma prothrombin level in early infancy, both in normal and in abnormal infants. Quick^{18, 19} has reported a high prothrombin level at birth, followed by a drop in the next forty-eight to seventy-two hours, and a subsequent rise toward the normal adult level during the ensuing week. These findings show a close correlation with the known variation in bleeding and clotting times during the neonatal period.^{20, 21*} In the cases here presented, however, such a relation was not regularly observed. Whereas in Cases 2, 15, 16 and 23 a low prothrombin in the first two or three days was succeeded in two to five days by a considerably higher level, Cases 12 and 20 exhibited a stationary or even a falling titer over a similar period. Thus, although Quick's observations probably represent the normal course of prothrombin fluctuation in young infants, this sequence of events may be disrupted by pathologic disturbances in early neonatal life. This possibility is borne out further by the prothrombin levels observed in the 11 patients showing evidence of intracranial injury. As seen in Table 3, the average prothrombin titer in this group was abnormally low. This observation may be correlated with the recent substantiation by Clifford²² of the observation that a large pro-

*7 Allen et al.²³ find neonatal prothrombin titer by the method to be much lower than those reported by various workers using Quick's method. They question the validity of the latter method for prothrombin determination on the newborn and offer evidence that the low neonatal prothrombin titer may be in effect partially offset by an increased convertibility of the prothrombin at birth. Pending further data on the validity of the various methods for prothrombin estimation, the use of Quick's method seems satisfactory particularly since it represents an actual measure of the efficiency of the prothrombin.

portion of infants with hemorrhagic disease of the newborn have a definite history of neonatal asphyxia. Clifford²⁴ has also drawn attention to the significant degree of liver damage found in infants dying with neonatal asphyxia—an observation of particular value in view of the known dependence of the blood prothrombin level on the integrity of the liver.²⁵ Hence it appears that neonatal asphyxia may in a certain number of cases be closely associated with the appearance of neonatal hypoprothrombinemia, if it is not in fact influential in the production of this condition.

No definite relation between prothrombin titer and clinical hemorrhage was observed. Whereas 8 patients with levels below 35 per cent (range 5 to 25 per cent, average 12 per cent) manifested a hemorrhagic tendency, 8 other patients with subcritical levels (range 15 to 30 per cent, average 22 per cent) showed no tendency to bleed. On the other hand, 4 of the 11 patients with initial prothrombin levels above 30 per cent exhibited melena. This melena, however, was not severe in any case, nor was it accompanied by other signs of a bleeding tendency. By contrast, 7 of the 8 bleeders with prothrombin levels of 30 per cent or less manifested either severe bleeding, a marked anemia or both, and all 7 had either a prolonged bleeding time or else bled for several hours from a skin puncture. In general, it was noted that infants with prothrombin titers below 15 per cent tended to bleed severely; those with titers from 15 to 30 per cent did not always bleed, but when they did, the hemorrhage was usually severe, whereas infants with titers above 30 per cent, though they might bleed, did not manifest more than transitory hemorrhage. Thus hemorrhagic disease of the newborn appears to be a syndrome in which two types of hemorrhagic tendency may be distinguished. There is a mild group having no intrinsic coagulation defect, in which transitory bleeding is probably induced by some factor such as gastrointestinal irritation from the primary bacterial invasion of the digestive tract,²⁶ vascular congestion or rupture of minor blood vessels during delivery. Severe bleeding, on the other hand, appears to have a close correlation with a low level of plasma prothrombin, and in the series of cases presented showed a close relation to prolonged bleeding time. The latter group might be regarded as having genuine hemorrhagic disease of the newborn, and must be differentiated from the first group in any evaluation of the etiology or therapy of this syndrome.

The very low prothrombin levels observed in Cases 18 and 20, in both of which severe nutritional disturbances were present, may be related

to the finding that the maintenance of a normal plasma-prothrombin level, even in an adult, is dependent on adequate assimilation of vitamin K.²⁷ In this connection, the recent reports of an elevation in the neonatal prothrombin level, following oral administration of vitamin K to newborn infants²⁸⁻³⁰ or to mothers before delivery,^{29, 30} are of great physiologic as well as clinical significance.

No correlation could be observed between prothrombin titer and duration of labor. Nor was any relation apparent between prothrombin level and birth weight. We were unable to confirm the correlation reported by Hellman and Shettles³⁰ between prematurity and low plasma prothrombin.

SUMMARY

Plasma prothrombin titrations were performed on thirty-nine venous bloods from 27 infants between the ages of three hours and twenty-five days. All but 6 of the infants were studied while under observation for some neonatal disturbance.

Titers ranged between 5 and 70+ per cent of the adult normal. No correlation could be observed between plasma-prothrombin level and birth weight or duration of labor.

Nine of 11 infants observed following neonatal asphyxia or intracranial hemorrhage had prothrombin titers below 35 per cent.

Although no absolute relation was observed between the prothrombin level and the tendency to hemorrhage, it was noted that infants with titers below 15 per cent tended to bleed severely; that infants with intermediate levels (15 to 30 per cent) might or might not bleed—when they did bleed, the hemorrhage was usually severe; and that infants with titers above 30 per cent sometimes manifested a transitory melena, but none in this series exhibited a severe bleeding tendency.

REFERENCES

- Whipple G. H. Hemorrhagic disease, septicemia, melena, neonatorum and hepatic cirrhosis. *Arch Int Med* 9:365-399, 1912.
- Brinkhous K. M., Smith H. P. and Warner E. D. Plasma prothrombin level in neonatal infancy and in hemorrhagic disease of the newborn. *Am J M Sc* 19:345-480, 1937.
- Warner E. D., Brinkhous K. M. and Smith H. P. A quantitative study on blood clotting: prothrombin fluctuations under experimental conditions. *Am J Physiol* 114:667-675, 1936.
- Quick A. J., Stanley Brown M. and Bancroft F. W. A study of the coagulation defect in hemophilia and in jaundice. *Am J M Sc* 190:501-511, 1935.
- Eley R. C., Green A. A. and M. Khann C. F. The use of a blood coagulant extra from the human placenta in the treatment of hemophilia. *J Pediatr* 8:135-147, 1936.
- Aggeler P. M. and Lucas S. M. Study of some variables affecting the prothrombin time. *Proc Soc Exper Biol & Med* 38:11-16, 1938.
- Stewart J. B. and Pohle F. J. Effect of calcium in quantitative determination of prothrombin. *Proc Soc Exper Biol & Med* 39:532-534, 1938.
- Quick A. J. On the relationship between complement and prothrombin. *J Immunol* 29:87-97, 1935.
- Kark R. Personal communication.
- Looney E. L., Kark R. and Taylor F. H. L. The coagulation defect in hemophilia: the clot promoting activity in hemophilia of the fetal normal human plasma free from fibrinogen and prothrombin. *J Clin Investigation* 18:693-698, 1939.
- Quick A. J. The coagulation defect in sweet clover disease and in hemorrhagic chick disease of 4 days or less: correlation of warfarin with prothrombin. *Am J Physiol* 118:270-271, 1937.

TABLE 2. *Clinical and Laboratory Data on Cases Studied.*

CASE No.	COMPLICATIONS OF PREGNANCY	DELIVERY	DURATION OF LABOR hr.	BIRTH WEIGHT lb. oz.	CLINICAL CONDITION	AGE OF INFANT	PROTHROMBIN LEVEL
						days	%
1	Latent syphilis	Forceps	11	7 4	Normal	$\frac{1}{8}$	70+
2	Latent syphilis, toxemia	Normal	2	6 10	Normal	3	70+
3	None	Breech	11	6 12	Brief period of resuscitation at birth	$\frac{1}{2}$	20
4	Diabetes	Normal	$3\frac{1}{2}$	5 10	Normal	4	35
5	None	Face presentation	$9\frac{1}{2}$	8 2	Pseudocyanosis, due to face presentation	1	40
6	Banti's disease	Normal	12	9 12	Normal	2	25
7	None	Normal	17	9 3	Colon-bacillus septicemia; discharged improved on 44th day	1	70+
8	None	Normal	$2\frac{1}{2}$	4 4	Three tarry stools on 2nd day; red-cell count 6,000,000, bleeding time 1 minute, clotting time $5\frac{1}{2}$ minutes	2	70+
9	None	Normal	21	9 4	Bloody vomitus at 2 hours; bloody stools at 24 hours; red-cell count 5,300,000, bleeding time 5 minutes, clotting time $3\frac{1}{4}$ minutes	25	70+
10	None	Normal	33	9 0	Coffee-grounds vomitus and tarry stool on 3rd day; red-cell count 5,200,000, bleeding time $2\frac{1}{2}$ minutes, clotting time 2 minutes	3	60
11	Hydramnios	Normal	10	8 15	Catheter resuscitation at birth, old blood in stools at 3 days; red-cell count 3,700,000, hemoglobin 87%, bleeding time 3 minutes, clotting time 4 minutes	4	50
12	Toxemia	Induced	10	6 1	Catheter resuscitation at birth, grossly bloody stools and marked dehydration at 2 days, old intracranial hemorrhage confirmed at 14 days; red-cell count 6,500,000 to 7,200,000, bleeding time 4 minutes, clotting time 5 minutes	3	25
13	None	Normal	24	5 0	Cyanotic attacks for 3 days after birth; bleeding for several hours from heel puncture; red-cell count 6,760,000, bleeding time 2 hours, clotting time not determined	7	10
14	None	Normal	?	9 0	Bloody vomitus and stools at 2 days; red-cell count 3,200,000, bleeding time 22 minutes, clotting time 6 minutes; transfusion given	24	70+
15	Funnel pelvis	Forceps	21	7 13	Given oxygen at birth; forceps hematoma of jaw, pink-stained vomitus and high-pitched cry at 36 hours; red-cell count 3,500,000, bleeding time 15 minutes, clotting time 3 minutes; on 4th day bleeding time 4 minutes, clotting time $4\frac{1}{2}$ minutes; lumbar puncture showed 540 red cells, mostly crenated	2	20
16	Prenatal vaginal bleeding	Induced	$3\frac{1}{2}$	8 13	Neonatal asphyxia, multiple ecchymoses, bleeding for 7 hours from heel puncture; red-cell count 5,000,000, bleeding time $6\frac{1}{2}$ minutes, clotting time 12 minutes; lumbar puncture suggested intracranial hemorrhage	4	15
17	Pyelitis	Normal	6	10 6	Red-tinged vomitus at 24 hours, recurring later on second day, heel puncture oozed for 24 hours, red-cell count 5,280,000, bleeding time $9\frac{1}{2}$ minutes, clotting time 13 minutes; transfusion given	7	60
18	None	Normal	?	9 11	Vomiting until 8th day, when operation relieved duodenal stenosis; heel puncture bled for 7 hours on 8th day; bleeding time not determined, clotting time 15 minutes, hemoglobin 80%	2	5
19	None	Normal	3	?	Jaundice on 3rd day, spontaneous ecchymoses from 10th day; cord stump bled intermittently after 12th day until transfusion was given on 19th day; operation at 8 weeks disclosed inspissated bile in common duct; red-cell count 1,640,000, bleeding time 30 minutes, clotting time not determined	8	5
20	None	Normal	14	7 7	Vomited all feedings from birth until regulated with thickened feedings at about 1 week; red-cell count 5,400,000 on 3rd day	19	5
21	Toxemia (mild)	Forceps	5	8 9	Mild cyanosis for 6 hours; marked caput succedaneum	3	15
22	None	Normal	7	9 11	Severe neonatal asphyxia; died in 16 hours	9	15
23	None	Breech	2	7 9	Right monoparesis at 1 day; lumbar puncture (2 days) showed 6000 red cells, all crenated	1	25
24	Hypertension in 45-year-old mother	Normal	24	7 14	Neonatal asphyxia with recurrent dyspnea on 2nd day; lumbar puncture showed 18,000 crenated red cells; diagnosis of residual high cervical-cord injury made at 3 months	$\frac{1}{2}$	30
25	Toxemia	Normal	2	8 13	Cyanosis and tense fontanelle on 3rd day; cyanosis still visible on 13th day; lumbar puncture unsatisfactory	1	20
26	None	Normal	14	9 12	Convulsive episodes from 2nd to 10th day; calcium therapy instituted on 10th day; lumbar puncture unsatisfactory, bloody tap (?)	5	70+
27	None	Breech	38	7 0	Head and shoulder injuries at birth; subdural hemorrhage; left subdural tap at 14 days showed 7200 crenated red cells	2	20

the patients had left the hospital after treatment for their injuries.

Diabetes insipidus may fall into a different category. The evidence is still too meager to justify a more definite statement, however. So far as it goes in support of trauma as a possible cause of this other type of diabetes, Bréhant, on the basis of one case, states that it cannot be regarded as rare or unusual and then "rings all the changes" on the old theoretical concepts of its cause.

SPINE AND SPINAL-CORD INJURIES

Although only remotely connected with the problem of spine and spinal-cord injuries, the papers by Zelig⁸ on congenital absence of the sacrum, by Kuhns et al.⁹—among other subjects—on motion in the vertebral column and by Batson¹⁰ on the function of the vertebral veins and their role in the spread of metastases merit detailed study. I can add another case to Zelig's collection and a note to the effect that, at the same time, there was another child in the wards who had a double sacrum; both cases were seen in consultation with Dr. Louis G. Howard. The importance of Batson's work can hardly be overestimated; any surgeon who deals with malignant tumors and their metastases should make himself familiar with it.

Papers on all aspects of rupture of the intervertebral disk, the protrusion of the nucleus pulposus and its compression of the cord, the cauda equina or the individual spinal roots continue to flood the literature. The best opinion today seems to be that a certain diagnosis of a protruded nucleus can be made only when there is a reasonably connected history of back injury, an increase of total protein content above normal in the specimen of cerebrospinal fluid that was collected closest to the assumed level of protrusion,—other samples having a normal content,—a defect, visualized by x-ray study in the intra-arachnoid column of lipiodol or air with or without a partial block, and finally a demonstration of peripheral neurologic changes that are characteristic of radiculitis and that can be explained only on the basis of an irritation or compression of one or, at most, two adjoining roots. Of all these requirements, the last is by far the most important. Indeed, my experience leads me to believe that when the tumult and the shouting have died down, it will come to be recognized as the one indispensable prerequisite for this diagnosis.

Air or, better still, oxygen is gradually replacing lipiodol as a means of visualizing the outlines of the spinal canal. Chamberlain and Young's¹¹ paper is most convincing. Poppen¹² re-

ports that "oxygen spinograms on 175 patients suspected of having herniated intervertebral disks were thought to be positive, and later verified by operation, in 150." On the other hand, Hampton¹³ reports an accuracy of 93 per cent in 133 cases in which iodized oil was used intrathecally. He strongly favors the use of this medium in preference to oxygen, even though he recognizes that the oil is a foreign body and may act as such in producing disturbing or dangerous effects. In this connection, Garland and Morrissey¹⁴ report finding intracranial collections of iodized oil some years following lumbar myelography in approximately two thirds of a series of 25 cases. However, they found no case in which any symptoms or positive neurologic findings could be ascribed to the presence of the oil. A more widespread use of oxygen or air is undoubtedly retarded by the technical imperfections of the method. These result in underfilling or overfilling of the sac and consequent poor visualizing of the edges of the column of oxygen.

It is still generally agreed that adequate orthopedic treatment should precede the use of laminectomy as a method of treatment of protruded nuclei. If laminectomy is used, the removed bone should never extend beyond one or two adjoining laminae on one side only. Mixer and Barr¹⁵ state that it is necessary to cut away only the upper and lower edges of two adjoining laminae. Hamby¹⁶ describes an interlaminar removal of the protrusion that he believes to be possible in some cases. It appears that, with such minimal bone removal and ligamentous damage, the operative removal of a protruded nucleus does not per se require subsequent fusion of the spine.

An end-result study of the bone lesions accompanying spinal-cord injuries in 76 cases is reported by Munro and Wegner.¹⁷ They point out that the therapy and prognosis of cervical-spine injuries that do not involve the spinal cord or are already chronic when first seen are quite different from those in which the cord injury plays a part and in which the patient comes for treatment immediately following the injury. Treatment in the combined cases is conditioned by the therapeutic needs of the damaged cord and the presence or absence of a spinal subarachnoid block. Fifty per cent of their patients died within the first forty-eight hours, and 45 per cent before discharge and as the direct or remote result of the injury. Abandonment of immediate laminectomy reduced their mortality 30 per cent. Twenty-eight of the 30 living patients had satisfactory end results, and 4 others died of intercurrent disease. These authors believe that the use of plaster-of-Paris casts

in cervical-cord injuries is dangerous and ordinarily contraindicated. In this connection, they¹⁸ have modified and used with satisfaction an adjustable cervical spinal brace. In connection with cervical spinal injuries and perhaps of importance from the industrial aspect is the report by Hanflig and Schlosberg¹⁹ of a rare case of nontraumatic dislocation of the atlantoaxial joint.

General care of spinal-cord injuries. Adequate tidal drainage of the urinary bladder is or should be an essential part of the general care of all spinal-cord and cauda-equina injuries. The original apparatus devised for this purpose was never intended to irrigate the bladder except as a secondary function. Its prime purpose was to permit the surgeon to adjust the intravesical pressure to the type of bladder that the apparatus was serving, and by regular emptying, in addition to a minimum of irrigation with some antiseptic solution, to counteract the deleterious effect of the residual urine that was necessarily always present. The inability to deliver significant quantities of irrigating solution to the bladder has now been overcome by one of the modifications of the apparatus devised by MacNeill and Bowler.²⁰ This improved tidal-drainage apparatus, as diagramed in Figure 6 of their article, should replace the original in the treatment of so-called "neurogenic bladders." When it is used, however, a change should be made in the irrigating fluid. If a 1:30,000 solution of potassium permanganate is introduced into a bladder in the large quantities that are permitted by this apparatus, either a mucous or alkaline cystitis is set up. In the latter event, calculi will form. These complications can be avoided by the use of 0.5 per cent acetic acid instead of the permanganate solution.

In line with the cystometrograms that are a necessary part of tidal-drainage therapy, White, Verlot and Ehrentheil²¹ have adopted the U type of cystometer²² for use in a study of activity of the colon. They have found that the colon is the physiologic analogue of the bladder. It has the same stretch reflex and the same ability to distend, to act as a reservoir and to initiate emptying contractions in response to a sensory stimulus caused by a given amount of fill. Its activity is governed by a spinal reflex, and emptying contractions may be inhibited but not initiated by impulses from the cerebral cortex.

With the overlapping of neurologic into genitourinary surgery, an authoritative statement concerning the use and abuse of the urethral catheter will be welcomed by neurosurgeons. This is found in Quinby's article.²³ The bacteriology of urinary-tract infection is well covered by Scholl et al.,²⁴ and the present status of urinary antisepsis by Cul-

ver and Seifert.²⁵ An interesting case of neurogenic dysfunction of the bladder due to spinal anesthesia is reported by Peirson and Twomey.²⁶

PERIPHERAL-NERVE INJURIES

With the advent of war, articles about peripheral nerve injuries again begin to appear in the literature. That war is not necessary to the proper understanding of perhaps the most important of all peripheral-nerve problems is evidenced by the article on the traumatic lesions of the nerves of the wrist and hand by Dr. Torr Wagner Harmer.²⁷ This classic was published shortly after his death and may well serve as a fitting memorial to him. In it the reader will find the last word on this subject.

From Germany comes an article by Ehalt.²⁸ He cites an experience with 77 cases of nerve injuries and advises that in cases of open nerve injuries immediate suture is required, but that in closed nerve injuries operation should not be performed until six months have elapsed, since the outlook for recovery is very favorable. Leriche²⁹ calls attention to the variability of results and their dependence on the particular nerve involved. He believes that traction on peripheral nerves prevents good healing. The best work comes from England. Three articles in the *Lancet* should be read in detail by all who are interested in this problem. One is by Cairns and Young³⁰ on the whole subject of treatment of gunshot wounds of the peripheral nerves; another is by Young and Medawar³¹ and concerns fibrin suture of peripheral nerves, with particular reference to the measurement of the rate of regeneration; and the third is by Young, Holmes and Sanders³² on the importance of the peripheral stump and the value of nerve grafts in nerve regeneration.

Finally, a paper by Homans³³ should be mentioned because of its importance as explaining one of the causes of hitherto unexplainable pain in the extremities. He speaks of it as "minor causalgia" and defines it as a "hyperesthetic neurovascular syndrome." It comes about in patients in whom probably "there is something basically at fault about the nervous system." Abnormal and painful neurovascular reflexes involving the sympathetic fibers in the vessels of the extremity and their connections with the central nervous system on the one hand and the small vessels on the other are initiated by apparently trivial peripheral stimuli. Fortunately these painful symptom complexes can usually be relieved by sympathetic-nerve block. Characteristic changes in the temperature, general appearance, color and often temperature of the skin in the painful area occur. The severer forms are associated with local injury and may be very chronic.

EPILEPSY

Gibbs³⁴ published in December, 1939, an extremely important paper on electroencephalography in epilepsy. In this study he presented clearly the present concept of epilepsy as exemplified by electroencephalographic and other associated diagnostic studies. From this work it is apparent that "fits" do not accompany all epileptic attacks, that there is a definite hereditary factor in the disease and that pathways of new investigation have been so opened out that one can say with the author that electroencephalography "has revolutionized the study of epilepsy." The following April, Lennox,³⁵ in a more general paper on the treatment of epilepsy and migraine, re-expressed the essentially diagnostic data published by Gibbs and added certain other facts concerning the relation between this disease and migraine and the various available methods of treatment with their advantages and drawbacks. No pediatrician, general practitioner, neurologist or neurosurgeon should fail to read these two papers in detail; no one today can either properly diagnose or properly treat epilepsy unless he is thoroughly familiar with their contents.

MISCELLANEOUS

Bedsore is a source of trouble and annoyance to nurses, patients and doctors alike. This is especially true in association with spinal-cord injuries. Munro³⁶ has presented evidence to show that in spinal-cord injuries there is reason to believe that all bedsore are preceded by pressure sores, which in turn develop because of too prolonged pressure on bony prominences, maceration of the skin, with destruction and removal of the protective horny layer, and local infection. In the presence of spinal-cord injury that destroys motor reflex activity—that is, spinal shock—and particularly in association with thoracic-cord injuries, the peripheral vasomotor reflexes cease to act. This causes spreading radial necrosis and the characteristic bedsore, as contrasted with the pressure sore. The treatment recommended is to move such patients once an hour; to prevent the development of any serious exhaustion by appropriate feeding, transfusions, administration of vitamins and the like; to prevent the occurrence of general sepsis and to maintain a constantly dry bed by the proper use of a tidal-drainage apparatus; and to avoid all forms of external artificial splinting or support to the spinal column so long as the patient with a spinal-cord injury is bedridden. This therapy is especially important in the thoracic-cord injuries. In connection with this work, it was noted that the patients had a severe hypoproteinemia, and that pressure sores and bedsore were already es-

tablished could be healed only by the feeding of very high protein diets. Ravdin,³⁷ Elman,³⁸ Holman³⁹ and Koster and Shapiro⁴⁰ all write on various aspects of this problem, although not directly about bedsore or pressure sores. Brooks and Duncan^{41, 42} contribute significant data on the effects of temperature on the survival of anemic tissue, and the effects of pressure on tissues in general.

Shuman and Jeghers⁴³ report their findings in relation to the value of routine blood-protein determinations in 320 consecutive cases.

Crandon, Lund and Dill⁴⁴ report on experimental human scurvy, and Lund⁴⁵ on the effect of surgical operations on the level of cevitamic acid in the blood plasma. Along this general line Elkinton, Gilmour and Wolff⁴⁶ contribute a useful paper on the control of water and electrolyte balance in surgical patients, and Maddock and Collier discuss the sodium chloride metabolism⁴⁷ and the water and electrolyte balance⁴⁸ in connection with surgical problems. Finally, Drew, Scudder and Papps⁴⁹ describe four simple tests by which data can be obtained in an emergency to determine the degrees of water and of water plus protein loss, to anticipate the onset of shock and differentiate it from simple circulatory collapse, to detect dehydration and to direct treatment more rationally for the alleviation of any of these conditions.

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REFERENCES

1. De Mangel, T. A propos des blessures crâniocérébrales *Mém Acad de chir* 65:1042 1048, 1939
2. Vincent, C. Sur la façon de traiter les plaies crâniocérébrales par projectiles *Mém Acad de chir* 65:1034 1042 1939
3. Duquing, J., d'Harcourt, J., Griffo, A. and Folch A. Principes généraux du traitement des plaies crâniocérébrales récentes par projectiles de guerre *Rev de chir*, Paris 58:625 644, 1939
4. Decker, P. and Rosner, J. Les plaies crâniocérébrales en chirurgie de guerre *Rev méd de la Suisse Rom* 60:321 356, 1940
5. Allen, A. M., Moore, M. and Daly, B. B. Subdural hemorrhage in patients with mental disease: a statistical study *New Eng J Med* 232:324 329, 1940
6. Joslin, E. P. Report on medical progress diabetes mellitus *New Eng J Med* 232:22 27, 1940
7. Bréhant, J. Diabète insipide traumatique *J de chir* 55:205 243, 1940
8. Zeltzer, I. M. Congenital absence of the sacrum *Arch Surg* 41:1220-18, 1940
9. Kuhn, J. G., Joplin, R. J., Elliston, W. A., Bailey G. G., Reidy, J. A., Freerberg, J. A., Milgram, J. E. and Ilied P. W. Seventy first report of progress in orthopedic surgery *Arch Surg* 40:1014 1038, 1940
10. Batson, O. V. The function of the vertebral veins and their role in the spread of metastasis *Ann Surg* 112:138 149, 1940.
11. Chamberlain, W. E. and Young, B. R. Air myelography in the diagnosis of intraspinal lesions producing low back and sciatic pain *Radiology* 33:695 700, 1939
12. Poppen, J. L. The use of oxygen in demonstrating posterior herniation of intervertebral disks *New Eng J Med* 232:978-982, 1940
13. Hampton, A. O. Iodized oil myelography use in the diagnosis of the rupture of the intervertebral disc into the spinal canal *Arch Surg* 41:453, 1940
14. Garlund, L. H. and Morrissey, E. J. Intracranial collections of iodized oil following lumbar myelography *Surg., Gynec. & Obst.* 70:196 210, 1940
15. Mixer, W. J. and Barr, J. S. Protrusion of the lower lumbar intervertebral disks *New Eng J Med* 232:525 529, 1940
16. Hamby, W. B. The mercurial removal of protrusions of the intervertebral disc at the fourth and fifth lumbar interspaces *Surg., Gynec. & Obst* 71:344 346 1940
17. Munro D. and Wegner, W. The bone lesions accompanying cervical spinal-cord injuries: an end result study of 76 cases *New Eng J Med* 232:167-173, 1940

18. Wegner, W. and Munro, D. A cervical-spine brace which reduces the use of plaster casts. *New Eng. J. Med.* 223:458-460, 1940.
19. Hanflig, S. S. and Schlosberg, C. Nontraumatic dislocation of the atlantoaxial joint. *New Eng. J. Med.* 223:713-716, 1940.
20. MacNeill, A. E. and Bowler, J. P. Irrigation and tidal drainage. *New Eng. J. Med.* 223:128-132, 1940.
21. White, J. C., Verlot, M. G. and Ehrenthel, O. Neurogenic disturbances of the colon and their investigation by the colonmetrogram. A preliminary report. *Ann. Surg.* 112:1042-1057, 1940.
22. Munro, D. The activity of the urinary bladder as measured by a new and inexpensive cystometer. *New Eng. J. Med.* 214:617-624, 1926.
23. Quinby, W. C. Report on medical progress urological surgery. the urethral catheter. *New Eng. J. Med.* 223:543-546, 1940.
24. Scholl, A. J., Hinman, F., von Lichtenberg, A., Hepler, A. B., Gutierrez, R., Thompson, G. J., Priestley, J. T., Wildbolz, E. and O'Connor, V. J. Review of urologic surgery. *Arch. Surg.* 41:154-208, 1940.
25. Culver, H. and Seifert, W. F. Urinary antiseptics collective review. *Internat. Abstr. Surg.* 70:574-581, 1940.
26. Pearson, E. L. and Twomey, C. F. Neurogenic dysfunction of the bladder due to spinal anesthesia. *New Eng. J. Med.* 223:171-174, 1940.
27. Harmer, T. W. Traumatic lesions of the nerves of the wrist and hand. *Am. J. Surg.* 47:517-541, 1940.
28. Elalt, W. Results in the treatment of peripheral nerve injuries. *Internat. Abstr. Surg.* 70:244, 1940.
29. Leriche, R. Des causes d'échec des sutures nerveuses moyens d'y pallier. *Presse méd.* 48:345-348, 1940.
30. Cairns, H. and Young, J. Z. The treatment of gunshot wounds of the peripheral nerves. *Lancet* 2:123-125, 1940.
31. Young, J. Z. and Medwiar, P. B. Fibrin suture of peripheral nerves measurement of the rate of regeneration. *Lancet* 2:126-128, 1940.
32. Young, J. Z., Holmes, W. and Sanders, F. K. Nerve regeneration: importance of the peripheral stump and the value of nerve grafts. *Lancet* 2:128-130, 1940.
33. Homans, J. Minor causalgia a hyperesthetic neurovascular syndrome. *New Eng. J. Med.* 222:870-874, 1940.
34. Gibbs, F. A. Electroencephalography in epilepsy. *J. Pediat.* 15:749-762, 1939.
35. Lennox, W. G. The treatment of epilepsy and of migraine. *New Eng. J. Med.* 222:657-662, 1940.
36. Munro, D. Care of the back following spinal cord injuries. A consideration of bed sores. *New Eng. J. Med.* 223:391-398, 1940.
37. Ravdin, I. S. Hypoproteinemia and its relation to surgical problems. *Ann. Surg.* 112:576-583, 1940.
38. Elman, R. Parenteral replacement of protein with the amino-acids of hydrolyzed casein. *Ann. Surg.* 112:594-602, 1940.
39. Holman, E. T. Vitamin and protein factors in pre operative and post operative care of the surgical patient. *Surg., Gynec. & Obst.* 70:261-269, 1940.
40. Koster, H. and Shapiro, A. Serum proteins and wound healing. *Arch. Surg.* 41:723-729, 1940.
41. Brooks, B. and Duncan, G. W. The effects of temperature on the survival of anemic tissue. an experimental study. *Ann. Surg.* 112:137, 1940.
42. *Idem.* Effects of pressure on tissues. *Arch. Surg.* 40:696-709, 1940.
43. Shuman, H. H. and Jeghers, H. The value of routine blood protein determinations. report of results in three hundred and twenty consecutive cases. *New Eng. J. Med.* 222:335-339, 1940.
44. Crandon, J. H., Lund, C. C. and Dill, D. B. Experimental human scurvy. *New Eng. J. Med.* 223:353-369, 1940.
45. Lund, C. C. The effect of surgical operations on the level of cevitamic acid in the blood plasma. *New Eng. J. Med.* 221:123-127, 1939.
46. Ellinton, J. R., Gilmour, M. T. and Wolff, W. A. The control of water and electrolyte balance in surgical patients. *Ann. Surg.* 110:1050-1066, 1939.
47. Maddock, W. G. and Collier, F. A. Sodium chloride metabolism of surgical patients. *Ann. Surg.* 112:520-529, 1940.
48. Collier, F. A. and Maddock, W. G. Water and electrolyte balance. *Surg., Gynec. & Obst.* 70:340-354, 1940.
49. Drew, C. R., Scudder, J. and Papps, J. Controlled fluid therapy with hematocrit, specific gravity, and plasma protein determination. *Surg., Gynec. & Obst.* 70:859-867, 1940.

**CASE RECORDS OF THE
MASSACHUSETTS GENERAL HOSPITAL**ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor***CASE 27181****PRESENTATION OF CASE**

A fifty-eight-year-old Russian-American entered the hospital complaining of weakness and dizziness.

The patient had been a hospital employee for twenty-five years, and four years before admission a routine physical examination was negative except for a rudimentary left ear, left palatal and facial weakness, with inability to close the left eye, and slight right torticollis; these defects had been present for as long as the patient could remember. Three weeks before admission his friends noticed that he was forgetting things, and he complained of slight weakness and dizziness. Ten days before entry the patient came to the Emergency Ward complaining of headache, wobbliness and weakness. He appeared "washed out," and his tongue was coated, but the examination was otherwise negative, the temperature being 97°F. and the pulse 88. The patient was ordered off work for four days, but at the end of that time he was suffering from headache, dizziness, fatigue, weakness, anorexia, generalized muscle pains, nausea and vomiting. A diagnosis of grippe was made, and he entered the hospital for two days; he then remained at home in bed for two days, after which he returned stating that since discharge he had been so weak that he fell when attempting to walk and was dizzy even when lying down.

The past illnesses and family history were irrelevant.

On examination the patient was well developed and well nourished, but vague and unable to cooperate. The left external ear and auditory meatus were absent. The pupils were small, but equal, the retinal vessels tortuous, and he was unable to count fingers accurately; it was impossible to make out the visual fields. A peripheral seventh-nerve palsy was present on the left, as had been noted four years previously. All four extremities were spastic, slightly more so on the left; there was no paralysis, but a definite impairment in the performance of fine movements. The tendon reflexes were equal but exaggerated, with ankle clonus and a Babinski sign bilaterally.

The tongue was dry and coated. Examination of the heart, lungs and abdomen was negative; the blood pressure was 120 systolic, 70 diastolic; the peripheral vessels were hard and tortuous, and the legs cold and mottled.

The temperature, pulse and respirations were normal.

The urine was normal. The blood showed a red-cell count of 5,300,000 with a hemoglobin of 16.5 gm. (photoelectric-cell technic), and a white-cell count of 8500. The nonprotein nitrogen of the blood serum was 18 mg. per 100 cc., and the blood Hinton reaction was negative. The stools were normal.

On lumbar puncture the initial pressure was zero; the fluid was slightly yellow; the white-cell count was 1, and the red-cell count 520 (cells not crenated), per cubic millimeter; the protein was 174 mg. per 100 cc.; the gold-sol curve was 2544521000; and the Wassermann reaction was negative.

On the fourth hospital day the patient was less confused. There was weakness of all movements of the left arm and leg, with a more marked spasticity in these limbs. The tendon reflexes were more active on the left side. Tactile fremitus was increased over the right lung base, with many coarse rales over the area. An x-ray film of the chest, taken three days later with a portable machine, showed ill-defined consolidation in both lower-lung fields, as well as in the medial portion of the right upper-lung field. The patient gradually weakened, lapsed into coma without developing further neurologic signs, and died two weeks after admission, the temperature rising to 103°F. three days before death.

DIFFERENTIAL DIAGNOSIS

DR. JOHN H. TALBOTT: This patient was fifty-eight years of age and had presumably always carried stigmas acquired in utero or at an early age. The rudimentary left ear, the left palatal and facial weakness and the right torticollis are of historical interest but are not pertinent to the discussion of the present complaint. All the presenting symptoms, as well as those which appeared during the three-week period of observation, indicate an acute and rapidly progressive process. His first complaint, which was called to his attention by his friends, was a poor memory. He had, in addition, headache, weakness, anorexia, nausea and vomiting, and dizziness. These symptoms, together with a subnormal temperature of 97°F., suggest an acute attack of adrenal insufficiency in an advanced stage of Addison's disease. The description of the weakness is particularly suggestive

of Addison's disease. Patients with this malady may fall to the floor in a heap after one or two attempted steps. There is little else to suggest a diagnosis of an Addisonian crisis, however, and I shall not consider it further.

On examination the patient was well developed and well nourished. This is presumptive evidence against certain types of cancer, either primary or metastatic. He did not have, I should say, carcinoma of the stomach with metastases to the central nervous system. Anorexia, nausea and vomiting might accompany carcinoma of the stomach, but if this disease had been responsible for the symptoms I doubt if the patient would have been described as well developed and well nourished. The first positive finding, which undoubtedly is pertinent to the discussion, is the presence of generalized spasticity. Although all the lower extremities were spastic, the left arm and leg were more so. A Babinski sign was observed bilaterally, as well as ankle clonus. These findings point to some disturbance of the motor tracts involving the right as well as the left side of the body. I should doubt if the lesions were as high up as the motor cortex, and I am inclined to place them at the site of decussation of the pyramidal tracts or lower. There is no mention made of any sensory changes, although it might have been difficult to collect precise data in a patient who had obvious central-nervous-system disease. I thought, in passing, of pernicious anemia to explain the generalized spasticity, but the red-cell count of 5,000,000, as well as a normal white-cell count, pointed against a diagnosis of Addisonian anemia. The white-cell count is also against an acute infection, such as multiple cerebral abscesses, to explain the picture. The nonprotein nitrogen was normal, and we cannot explain the nervous changes on the basis of renal insufficiency and uremia. No mention was made of any intoxication or self-administered poison, and we are forced to dismiss this possibility without further discussion. The blood Hinton reaction was negative, as was the spinal-fluid Wassermann reaction. One thinks of cerebrovascular syphilis in such a clinical picture as this, but again we must dismiss the possibility for want of more evidence. The record tells us that the initial pressure during a lumbar puncture was zero. Was that repeated? Was any statement made in the record about this interesting point?

DR. CHARLES S. KUBIK: I do not believe that it was.

DR. TALBOTT: It is unusual to get a lumbar-puncture pressure of zero without commenting on it.

DR. KUBIK: It is.

DR. TALBOTT: I wonder whether this was a valid observation, but since it was not repeated, we must accept it at its face value or even disregard it if we choose. The spinal fluid was slightly yellow, and the cell count was 1 white cell and 520 red cells per cubic millimeter. Since the red cells were not crenated, it is possible that they were introduced at the time the tap was performed and were not present in the spinal fluid before the tap. We cannot, however, attribute a spinal-fluid protein of 174 mg. per 100 cc. to trauma. If one considers the amount of protein that accompanies a red-cell count of 520, there is still a wide gap between this value and 174 mg. The presence of slightly yellow fluid is additional evidence in favor of previous mischief in the central nervous system.

I should like to see the x-ray films at this point.

DR. GEORGE W. HOLMES: We have only one film, and that was taken with a portable machine. Apparently the patient was rather sick. The evidence is not complete. I hope it will not confuse rather than help you.

In this film the right lung field looks smaller than the left. I do not think you can rely on this finding, but I think you should consider it.

Here near the root of the right lung is a dense poorly defined shadow, which could be interpreted as a mass. The heart shadow is within normal limits. There is no evidence of fluid in the pleural spaces. There are also changes in the lower part of the right lung. One way to interpret it would be to say that this mass at the root of the lung accounted for the decrease in the size of the chest, and the changes in the lower part of the chest, and that it was causing interference with passage of air into the lung. Another way to interpret it is to say this was part of a bronchopneumonic process, and that the mass was caused by enlarged lymph nodes.

DR. TALBOTT: Are you able to exclude a large pulmonary infarct or multiple infarcts?

DR. HOLMES: I think that is unlikely. It could be an acute respiratory infection, or it could be a tumor.

DR. TALBOTT: If it is tumor, does it look more like primary bronchiogenic carcinoma, a mediastinal lymphoma or a Pancoast tumor?

DR. HOLMES: If it is tumor, it is a primary bronchiogenic tumor.

DR. TALBOTT: It is not infrequent to see patients admitted to the hospital complaining of cerebral symptoms who have perfectly negative histories of disturbance in the lungs, yet we may find a primary bronchiogenic tumor that has metastasized to the brain. I recall very vivid-

ly one patient known to most of us a decade ago who had essentially that story. His presenting complaints on admission to the hospital were cerebral and not pulmonary. There was nothing in the history to suggest a primary tumor in the lung. Following a cerebral exploration a metastatic lesion was discovered, and it remained for the pathologist to tell us that it was probably primary in the bronchus. Another point in favor of a primary bronchiogenic carcinoma in the patient under discussion is the statement regarding nourishment and development. I believe that if this patient did have a tumor with metastases it was consistent only with a bronchiogenic carcinoma.

Before I came to this conference, I was inclined to put primary bronchiogenic carcinoma as a second possibility, and believed that the patient's symptoms were probably due to a cerebral vascular accident. Multiple thromboses of the cerebral vessels could give most of the findings described. With this syndrome there may be a story of forgetfulness, weakness and dizziness, and the course may be as rapid or more rapid than that observed here. It could explain everything up to the rise in temperature three days before death. If we assume the primary cause of death was cerebral thrombosis, then we can attribute the terminal rise in temperature to an infection in the lungs, or better to a pulmonary infarct, which is usually not recognized as a terminal event. In conclusion, I propose to adhere to my preconference diagnosis of cerebral thrombosis and put down as a second possibility, primary bronchiogenic carcinoma with cerebral metastases.

DR. EDWARD F. BLAND: May I ask for information about the lumbar puncture? Does that mean block above the site of puncture?

DR. KUBIK: We occasionally find a low spinal-fluid pressure in cases with increased intracranial pressure. We see it rather rarely, and usually after a previous lumbar puncture, but here it was observed at the first puncture. In some of these cases we find a herniation of the brain through the tentorium, with flattening and obstruction or partial obstruction of the aqueduct. With such a condition any escape of spinal fluid before the manometer is connected to the needle may cause the pressure to drop rapidly.

DR. BLAND: What does jugular compression do in such a situation?

DR. KUBIK: One should not try jugular compression in a situation like that. There would probably be a little rise in the spinal pressure. It might also result in death from respiratory failure.

What do you really think about the films, Dr. Holmes?

DR. HOLMES: I do not know. It would just be a guess. There is insufficient evidence, and the examination was incomplete.

DR. KUBIK: What would you guess?

DR. HOLMES: If I had to make a guess, I should agree with Dr. Talbott.

DR. AUGUSTUS S. ROSE: If it is a brain metastasis, would Dr. Talbott make a statement as to where he thinks it was?

DR. TALBOTT: It was bilateral. If cerebral thrombosis is the correct diagnosis, then there might have been several areas of softening in the brain stem. Certainly the lesions must have been below the motor cortex.

DR. ROSE: There is no definite statement about papilledema.

DR. TALBOTT: I did assume, however, that there was no increased intracranial pressure. No mention was made of retinal exudates, and there was no good description of the retinal vessels. One sentence included in the abstract is difficult to interpret: it is mentioned that it was impossible to make out the visual fields. Does this mean that the patient could not co-operate, or that the visual fields were so restricted that they could not be determined accurately?

DR. KUBIK: I should think the former.

DR. TALBOTT: That is what I assumed.

DR. KUBIK: Sometimes the examiners are too easily discouraged.

CLINICAL DIAGNOSIS

Cerebral accident.

DR. TALBOTT'S DIAGNOSIS

Cerebral thrombosis, with pulmonary infarcts,
Or primary bronchiogenic carcinoma, with metastases to the brain.

ANATOMICAL DIAGNOSES

Bronchiogenic carcinoma of the lung, with metastases to the brain.
Agenesis of the left middle ear and congenital deformity of the left auricle.
Pleuritis, fibrous.
Anthraxis, marked.

PATHOLOGICAL DISCUSSION

DR. KUBIK: This was a bronchiogenic carcinoma of the left upper-lobe bronchus, measuring about 7 cm. long and 4 cm. in diameter. Metastases were present only in the brain, and those, as usually happens, were multiple. The largest

one, measuring between 4 and 5 cm. in diameter, was in the right occipital lobe. There were smaller ones near the upper part of the motor cortex on the right, in the right temporal lobe and in the cerebellum, very near the dentate nucleus, which may, I suppose, have accounted for some of the dizziness. There was some herniation of the hippocampal gyrus through the tentorium. This probably accounted for the low spinal-fluid pressure.

The shadow seen in the x-ray film, on the right side, represents enlarged lymph nodes, in which, however, there were no metastases. The tumor itself is not visible in the film.

DR. HOLMES: I have been told by a member of your department that metastases below the tentorium are very uncommon. Do you agree with that?

DR. KUBIK: No; they are found above and below, often in the same case.

DR. HOLMES: So many of these people with bronchiogenic carcinoma die of respiratory failure that I was wondering if the metastasis to the base of the brain was the original cause of that.

DR. KUBIK: I can recall several cases with cerebellar metastases, or cases in which there were both cerebral and cerebellar lesions, those in the cerebellum being much larger and chiefly responsible for the patient's symptoms. I should agree so far as to say that metastases to the forebrain are commoner.

CASE 27182

PRESENTATION OF CASE

A forty-five-year-old French-Canadian housewife entered the hospital complaining of nausea and epigastric pain.

Twenty-five years before admission, the patient began to suffer from attacks of nausea and vomiting that lasted several days and recurred every few months. These attacks were relieved by the induced vomiting of a sour, yellow fluid. Between times her appetite was good, but she disliked fried food and sweets and believed that they initiated the attacks. Nine years before entry, recurrent attacks of moderately severe, sharp, nonradiating, high epigastric pain appeared, occurring after meals and lasting but a few minutes. Four years before admission, the patient suffered a very severe knifelike, mid-epigastric pain, which radiated to the back and was associated with nausea and vomiting. This attack lasted four days and then subsided, but recurred two years later, when it lasted one day. At another hospital, three months before admission, a laparotomy was per-

formed for an intended cholecystectomy, but a small fairly well-circumscribed mass was found on the anterior wall of the stomach near the pylorus, and another mass was noted on the dome of the right lobe of the liver. The gall bladder was said to have been filled with stones, but a cholecystectomy was not done. Because the patient had not been prepared for gastric resection, only a biopsy of the gastric tumor was performed; the specimen was reported as a slowly growing adenocarcinoma. One month before admission the patient noticed that for two days her stools were yellow; at that time she entered still another hospital, where she remained until admission here. X-ray examinations at the above institution were essentially normal, and no gastric abnormality could be demonstrated, except for pylorospasm.

At no time during this illness had jaundice been noticed, although it had been present on one occasion when the patient was ten years old; no change in the color of the urine had ever been noticed. The patient had always been mildly constipated and frequently used laxatives. She had lost 20 pounds in the year prior to operation, but had gained 7 pounds since operation.

The patient's father had died of cancer, and "numerous" aunts and uncles on her father's side had succumbed to this disease.

The patient was well developed and moderately obese. Examination was essentially negative except for a healed right-rectus epigastric surgical incision; the blood pressure was 130 systolic, 70 diastolic.

The temperature, pulse and respirations were normal.

The urine was normal. The blood showed a red-cell count of 3,400,000 with a hemoglobin of 75 per cent, and a white-cell count of 6800. The nonprotein nitrogen of the blood serum was 17 mg., the protein 6.6 gm. per 100 cc. and the chlorides 101.8 milliequiv. per liter. A blood Hinton reaction was negative; the serum van den Bergh was normal. A gastric analysis showed no free hydrochloric acid, even after histamine.

A gastrointestinal series on two occasions failed to show evidence of tumor or ulceration in the stomach. The prepyloric area was slightly elevated, possibly owing to postoperative adhesions.

A Graham test showed a faint shadow of the filled gall bladder, superimposed by the hepatic flexure. There were areas of decreased density in the region of the gall bladder, which were either stones or superimposed intestinal gas, more likely the former. The patient was unable to retain the fatty meal.

At gastroscopy a normal peristaltic wave was seen repeatedly, passing over the antrum to a tight closure, presumably the pylorus. No abnormality was visible in the antrum or pylorus. Throughout the body of the stomach there was slightly increased reddening, especially on the crests of the rugae. There was no visible verrucous appearance, ulceration or neoplasm.

A laparotomy was performed one week after admission.

DIFFERENTIAL DIAGNOSIS

DR. MYLES P. BAKER: Perhaps we might look at the x-ray films first.

DR. JAMES R. LINGLEY: Dr. Richard Schatzki performed the two gastrointestinal examinations, and since he had been warned that carcinoma of the stomach had been found at a previous operation you may be sure that he made the examination with great care. He was, however, unable to detect anything wrong with the stomach. As stated in the record, the antrum appears to be slightly displaced upward, and there is a suggestion of pressure defect here, all of which can be attributed to the previous operation. The Graham test showed a poorly functioning gall bladder, a very pale shadow with areas of rarefaction, which were quite sharply defined, round and quite consistent with gallstones.

DR. BAKER: Have you any comment, Dr. Benedict?

DR. EDWARD B. BENEDICT: I had a good look at this patient's stomach. She co-operated well. I could see the antrum and the body all the way around the stomach and could watch the peristaltic waves to the pylorus, but I could see no intragastric lesion.

DR. BAKER: I am assuming that two facts are true. One is that the biopsy diagnosis of adenocarcinoma was correct. I am also assuming that, if the surgeon were able to take a biopsy specimen from a mass described as being on the anterior wall of the stomach near the pylorus, the mass would be in the nature of a fairly large peritoneal implant. Certainly it was quite a superficial mass. We have no evidence here that the carcinoma projected from the gastric mucosa, for there was no evidence by x-ray or gastroscopy of a demonstrable mass. I should have expected that one of these procedures would have revealed a tumor, were its origin in the gland-bearing tissue of the gastric lining. It is unusual for a peritoneal implant to invade the stomach wall and cause ulceration and hemorrhage, but of course it sometimes does.

I think the description of the location of the

mass and the subsequent negative findings are more in keeping with the possibility of a secondary adenocarcinoma originating elsewhere. We have no evidence that it was primary in the colon. Presumably a barium enema was given on the second hospital admission. We have no evidence of pelvic neoplasm. The question comes up whether in the presence of known gallstones this patient could have had an adenocarcinoma primary in the gall bladder. It is true that three out of four cases of primary carcinoma of the gall bladder develop in gall bladders that contain stones, as this woman's did. Jaundice and a palpable tumor, which are commonly found with carcinoma of the gall bladder, are not present in more than 50 per cent of the cases. One could have a small carcinoma of the gall bladder and have symptoms only from metastatic disease, or of course from the associated gallstones. On the other hand, metastases from gall-bladder carcinomas are generally characterized by direct extension to the liver, and the regional lymph nodes are involved early. I think such lymph nodes would have been palpable at the previous operation, three months prior to entry here. Peritoneal metastases from gall-bladder carcinomas develop later.

What then of the possibility of adenocarcinoma originating in the body of the pancreas, which is said to develop in cases of chronic pancreatitis and may be associated with gallstones of some duration? Weight loss, which was rather prominent in this case without any story of persistent indigestion, and repeated attacks of pain sufficient to cause lack of appetite and weight loss are prominent features in the progress of cases of carcinoma of the pancreas. Abdominal pain such as this patient must have had to induce decision for surgery for gallstones can occur with carcinoma of the body of the pancreas. If that diagnosis is correct, some of the pain might have been due to the pancreatic lesion rather than to the gallstones. Metastases from such a growth are characteristically spread directly along the peritoneal surfaces from the body of the pancreas. Any tumor in the body of the pancreas could not be very distant from the peritoneal surface, and I think there is a real possibility that this tumor originated in the pancreas with metastasis to the liver and to the anterior wall of the stomach. The description, "a slowly growing adenocarcinoma," is in keeping with such a tumor. The achlorhydria is not inconsistent with such a diagnosis. About one out of six or eight cases of carcinoma of the body of the pancreas without jaundice shows achlorhydria and an anemia of varying character. I can draw no conclusions from the yellow stools mentioned here.

I am more interested in knowing whether the patient had occult blood in the stools. We have no mention of that, so that we are not sure why this patient was anemic.

DR. TRACY B. MALLORY: I am sure occult blood was searched for and not found in the other hospital. In our laboratory one stool was guaiac negative.

DR. BAKER: That does not change my diagnostic impression. I know it is possible that x-ray examination may miss a gastric tumor, but I should not expect it to miss an adenocarcinoma. Pressure defects in the region of the pylorus are not uncommonly found when the tumor is primary in the body of the pancreas.

DR. MALLORY: Dr. Sweet, will you tell us what you found at operation?

DR. RICHARD H. SWEET: We were not confronted with the necessity of committing ourselves definitely, as Dr. Baker has been this morning, so that we performed the operation with the idea of finding out what was the matter with the patient. We were impressed with the history that the previous surgeon had found a tumor of the liver, and assumed that it might be a metastatic growth. The first thing I did on entering the abdomen was to expose and take a biopsy specimen from this liver tumor, which was nodular and rather firm. It was located in the dome of the right lobe and had the characteristic appearance of a hemangioma. The Pathology Laboratory confirmed the diagnosis. The patient had gallstones, which were easily felt. The tumor in the region of the antrum was an interesting one. It measured 3 cm. in diameter. It did not feel like carcinoma; its consistence was not uniform, parts of it being firm, and other portions soft. It was attached to the first portion of the duodenum, as well as to the antrum of the stomach, and it felt to me, as I was resecting it, more like a leiomyoma or neurofibroma of the wall of the stomach. It was covered by adhesions, which had resulted from the previous exploration. It was attached to the anterior wall of the stomach, but seemed to come off from the inferior margin of the duodenum and antrum and lay in a hollowed-out depression in the head of the pancreas. Having had the biopsy report from the other hospital of "a slowly growing adenocarcinoma," we assumed that it would be best not to biopsy the tumor again, and I merely did a resection, thinking that by cutting into it I should be spreading about a malignant tumor, although, as I have said, it was a peculiar feeling tumor. I wished after I finished the operation that we had called for the slides from the hospital where the patient had been operated on before.

Having done a radical resection, we had only a few moments left to turn our attention to the cause of the symptoms, namely, the gallstones. The patient had had characteristic gallstone attacks. I therefore opened the gall bladder, scooped out the stones, which were rather large, and closed the gall bladder and then the abdomen. She has since gone home in a state of good health.

CLINICAL DIAGNOSES

Cholelithiasis.

Gastric tumor.

DR. BAKER'S DIAGNOSES

Cholelithiasis.

Carcinoma of pancreas, with metastases to liver and peritoneum.

ANATOMICAL DIAGNOSES

Cholelithiasis.

Ectopic pancreas.

Hemangioma of liver.

PATHOLOGICAL DISCUSSION

DR. MALLORY: Dr. Baker and the clinicians in the hospital here made the natural assumption that, when a biopsy had been done and carcinoma reported and when that appeared to be substantiated by the presence of a metastatic nodule in the liver, there could be no doubt that the patient had cancer somewhere. That, however, was not true. As you have already heard from Dr. Sweet, the nodule in the liver was a hemangioma, an extremely common tumor in the liver, present in more than 2 per cent of all autopsies. The nodule in the stomach and duodenal wall showed on cut surface finely lobulated tissue, which was quite obviously pancreatic even on gross examination. A frozen section readily confirmed that. Nodules of ectopic pancreatic tissue are very common in the duodenum and by no means rare in the stomach. If they happen to be in or close to the pylorus, which is the common location, they may cause a little obstruction. More often, however, they are present without causing any symptoms, which I think was the case here.

The original microscopic slides from the other hospital were finally obtained and reviewed, and it was perfectly obvious in retrospect that they showed pancreatic tissue, not carcinoma. These cases are not extremely common, and I think a good many pathologists, particularly those in small hospitals, may never have seen a case. It is a natural mistake to make, although I think in any of the large hospitals the true character of the tissue would have been recognized even from a small biopsy specimen.

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal
Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of
THE MASSACHUSETTS MEDICAL SOCIETY
and
THE NEW HAMPSHIRE MEDICAL SOCIETY

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SUBSCRIPTION TERMS: \$5.00 per year in advance, postage paid for the United States; Canada \$7.04 per year; Boston funds \$8.52 per year for all foreign countries belonging to the Postal Union.

MATERIAL for early publication should be received not later than noon on Saturday.

This journal does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the New England Journal of Medicine, 8 Fenway Box on Massachusetts.

Dr. A. Warren Stearns on Thursday following the annual meeting of the Society. A group of papers on vitamin therapy and one on intestinal obstruction should prove to be particularly valuable, and the talks by Dr. Frank H. Lahey, president elect of the American Medical Association, and by Dr. Philip D. Wilson, of New York City, should be very enlightening. As in previous years, there will be a continuous motion picture program, many of the films are in color, and a few are accompanied by sound effects.

The ladies' program will open with music and tea at the Gardner Museum on Wednesday afternoon, followed by the annual dinner at the Ritz Roof, where entertainment will be provided by an exceptionally good floor show. On Thursday, there will be a trip to the South Shore. Following visits to the Dorothy Quincy House and the Adams Mansion in Quincy and to the Old Ship Church and the Cushing Homestead in Hingham, luncheon will be served at Hugo's in Scituate. The trip back to Boston will be made along the famous Jerusalem Road.

The Committee of Arrangements and the Ladies' Committee are to be congratulated for devising well balanced, comprehensive and interesting programs. The attendance at the one hundred and sixtieth anniversary of the Massachusetts Medical Society should be record breaking.

ANNUAL MEETING

The program arranged for the annual meeting on Wednesday and Thursday, May 21 and 22, at The Copley Plaza, Boston, and reprinted in this issue of the *Journal*, should interest every member of the Massachusetts Medical Society.

Briefly, the two day program is divided into the following papers of general interest on the mornings and afternoons of both days — those on Thursday morning constitute a symposium on hormones, and those on Thursday afternoon, one on war medicine, seven sectional luncheon round table discussions on Wednesday, for which reservations should be made immediately, and the two annual lectures — the Shattuck Lecture, delivered by Dr. Alton Ochsner, of New Orleans, on Wednesday evening and the Annual Discourse, delivered by

SALE OF ALCOHOL IN MASSACHUSETTS

THERE is a law in Massachusetts that permits the unrestricted sale of 190-proof grain alcohol over the counter by druggists "for mechanical, chemical and medicinal purposes only," without a physician's prescription. From the nature of the statute it is evident that a buyer may use this alcohol for a beverage if he so wishes. The inadequacy of this law has sounded severe repercussions in Massachusetts. In Boston the death rate from alcoholism has increased considerably since the repeal of prohibition. In New York, where grain alcohol is available only on a physician's prescription, the death rate from alcoholism has decreased sharply since the repeal of prohibition.

Massachusetts is the only state in the Union where the unrestricted sale of grain alcohol is permitted.

The grain-alcohol problem asserts itself in the following manner. Although a person dilutes the alcohol with cheap wines and other beverages at the beginning of the alcoholic episode, the subsequent dilutions are apt to grow progressively weaker, and the blood-alcohol level may rise to a point incompatible with life.

The serious problem of alcoholism in Massachusetts has long been recognized. For example, Massachusetts ranks third among the states in incidence of mortality from alcoholism, according to Schmid.¹ Alexander, Moore and Leary² report that 4505 deaths certified by medical examiners in Massachusetts from 1928 to 1938 were directly related to the ingestion of ethyl alcohol; they also found that more deaths from alcoholism occurred in Massachusetts than from all other toxic substances combined. Dayton³ has recently revealed that, of 56,579 first admissions to Massachusetts mental hospitals between 1917 and 1939, 32 per cent of male patients were classified as intemperate and that alcoholic psychoses ranked third among the causes of admission to those institutions in 1938. Kolb,⁴ with the aid of the police departments and departments of health of several large eastern cities, showed that in 1939 the number of arrests for intoxication and of the deaths due to alcoholism per 100,000 population, respectively, were as follows: Boston, 5171 and 16.4; Baltimore, 331 and 1.9; New York, 112 and 4.5; Philadelphia, 1608 and 2.4; and Washington, 2987 and 3.9.

On March 20, 1941, a bill was heard before the Committee on Legal Affairs of the Massachusetts legislature that would greatly alleviate the problem of alcoholism by requiring a physician's prescription for the sale of grain alcohol. It received its only opposition at the hands of a paid druggists' lobbyist. It is essential that this bill should be reported favorably by the Committee on Legal Affairs. If it is to succeed, it must be wholeheartedly supported by the Massachusetts Medical Society, and each member is urged to write to his senator and representative.

REFERENCES

1. Schmid, C. F. Mortality from alcoholism in the United States. *Quart. J. Studies on Alcohol* 1:432-441, 1940.
2. Alexander, L., Moore, M. and Leary, T. Deaths from poisoning by alcohol in Massachusetts. 13 pp. Preprinted from *Am. J. M. Hyg.*
3. Dayton, N. cited in: Alcoholism and the alcoholic: a brief report of a three-day symposium conducted by the Research Council on Problems of Alcohol at Philadelphia, Pa., December 27-29, 1940. *Ment. Hyg.* 25:322, 1941.
4. Kolb, L. Alcoholism and public health. *Quart. J. Studies on Alcohol* 1:605-621, 1941.

OBITUARY*

LLOYD VERNON BRIGGS

1863-1941

Lloyd Vernon Briggs died at Tucson, Arizona, on February 28, 1941, in his seventy-eighth year. Such is the record of a simple fact. Not so simple is the task of portraying the personality of this man, a personality that impinged on the professional and public life of the State of Massachusetts, and ultimately made him the motivating and directing force behind a social organism that grew to proportions attracting the rest of the country, and, in fact, the rest of the world, for advice and consultation.

Dr. Briggs was born in Boston, but his roots went back into the old Plymouth Colony. Going back to many of the families that settled in and about Scituate and particularly at Hanover, his ancestry is a fair catalogue of the vigorous persons who, by growing strong themselves in that territory, helped to make Massachusetts strong. With all his other interests, very much in the foreground were affairs having to do with Hanover and its history. Among his earliest publications were historical treatises, of which the record of shipbuilding on the North River is pre-eminent. His interest was not archaeological, genealogical or even historical—it pervaded all these fields. Never an ancestor worshipper, he had felt himself to be a part of that great living organism that started so humbly three hundred years ago and developed into a substantial fraction of the nation.

No one could think of Dr. Briggs without envisioning old houses and old furniture. His eye caught the unique as well as the beautiful, and long before such collecting had become fashionable, he and his wife had garnered many precious things, not only from their own families, but here, there and everywhere. This interest and evidence of good taste reached its superlative in the house at 64 Beacon Street, though the houses at Hancock, New Hampshire, and Hanover, Massachusetts, were close rivals. So much fine furniture and so many fine furnishings seem never to have been associated with one family.

*The following statement was adopted and placed on the records of the New England Society of Psychiatry and Neurology, at its meeting at Newtown, Connecticut, April 10, 1941.

When yet a boy, Dr Briggs made a trip in a schooner to what were then the Sandwich Islands, and took part in vaccinating the native population. Incidentally, he made friendships that lasted throughout his life. From this time on he seems to have been a doctor, taking courses here and there, and especially at Tufts, Dartmouth and Harvard, but continually occupying himself with medical matters. For a few years he was concerned with the care of patients in various private sanatoriums in Massachusetts. He soon assumed responsibility for patients himself, traveling about with them or caring for them at Hancock or Hanover. In 1899 he took his medical degree from the Medical College of Virginia at Richmond. He then started active practice in psychiatry in Boston. For a while his private patients absorbed his attention, but soon the public care of the insane became the ruling passion of his life.

He soon interested himself in the Massachusetts institutions. These institutions were unquestionably good at that time, and yet there were new things to be done. A liberalizing movement was on foot, pervading all human affairs. Certain old abuses had to be abolished, and certain new techniques had to be installed. Massachusetts institutions had grown up and flourished under a system of trusteeships. These called on the best in the community for gratuitous service, and the record of one hundred years or more is undeniably good. But the germ of centralized public control had arrived, and the gradual assumption of responsibility by a state board could no longer be resisted. Beautiful as the old and perhaps more benevolent attitudes were, efficiency and standardized effort were in the air. Dr Briggs put his heart and soul into this, allying himself with many of the leading figures in America who were doing similar work in other states. One need not dwell on the bitterness aroused. It is enough to evince in the achievement of the construction of the present Massachusetts Department of Mental Health, with a single directing head. Dr Briggs did this almost alone, and it is only fair to say that almost alone he selected the late George M. Kline as the new leader of this good work in Massachusetts. This is not the place to relate the growth and development of the new department, magnificent as its proportions are, but it is the place to say that Dr Briggs followed every detail of this work with an earnestness and a vigor that were no small part of its success. He continually suggested new ideas and, not content with merely making the suggestions, saw to it that they were put into effect.

The house at 64 Beacon Street became the cen-

ter or focal point from which emanated much of the drive behind forward looking movements for the better care of the mentally sick. The whole scene was broadened, so that psychiatry, at last let out of the institutions, became a living force permeating the schools and prisons, as well as the hospitals. With it all a gentleness and kindness beamed forth so continually that all in trouble—however bad they may have been, however low their origin, however unattractive their cause—had a kind considerate hearing, and were given wholesome advice at 64 Beacon Street. Here persons with a great idea to propose found a ready enthusiasm to support them, here people crushed by adversity also went, and found a tender helping hand ready to direct them to a source of comfort or help.

In the midst of this herculean task of organizing the care of the mentally sick in Massachusetts came World War I. Dr Briggs was immediately found in uniform. While others were wondering what was the best thing for them to do, he was at Camp Devens putting mental hygiene into the Army. Soon, surrounded by a group of fellow officers, he demonstrated that even the conservatism of the military could not dampen his ardor and determination that the mentally sick should not be taken into the Army, and that if they got there, they should have the best care. Soon the great days in France came about. He seemed to be everywhere. At any rate, he knew everyone of consequence in the AEF and was one of the important figures in the Medical Department of the Army. He became an intimate friend of General Ireland and through this friendship was able to exert considerable influence in matters pertaining to military medicine. He rejoiced in the title of "Colonel" and often used it on his stationery. He often said humorously that the War Department was determined to retire him at the age of ninety.

When the war was over, there was still plenty to do. From early morning until late at night, there was incessant activity. The Division of Mental Hygiene in the Department of Mental Health was to be organized and supported. But the crowning achievement was the passage of the Briggs Law in 1923. For a hundred years there had been provisions for the examination of prisoners accused or suspected of crime, but the initiative rested entirely with partisan lawyers or indifferent officials. Out of the void came the Briggs Law, a provision ensuring the examination of persons accused of major crimes by a nonpartisan board selected by the Department of Mental Health with only nominal remuneration. This law, copied

elsewhere and praised by all, needed support for a while. This support Dr. Briggs valiantly gave. He continually tested it out and sought revision until at last it stands a model for all and a permanent monument to Dr. Briggs.

The need for classifying the inmates of the prisons had long been felt, and yet efforts to bring this about proved quite ineffective until in one interview with Governor Joseph B. Ely, Dr. Briggs succeeded in having a division set up and a budget provided for the examination and classification of inmates in prisons.

Then came the mellow days—still much to do about military affairs, still much concern about the workings of the state hospital system, but interspersed with trips to Europe, visits to the South in the winter, and longer seasons at Hancock in the summer. No one ever sat at table with Dr. Briggs as host, with every morsel of food selected and prepared under his direction, and bounteously served, without coming under the spell of his friendliness and his influence. People came from everywhere seeking advice or information—all sorts of people of all grades of society wended their ways to his fireside, and they were cordially received and directed to the best source of further information. He had a peculiarly canny side to his mind that instinctively separated and discarded the irrelevant and fastened on that part of information which was pertinent. Although his whole life was spent with mental disease, one never heard him speak of hallucinations or delusions, complexes or frustrations. He dealt with people in trouble and knew in round numbers how to help them. Although his life was spent with leaders in every walk, he always championed the cause of the underdog.

There were signs for some time that things were not right with his vascular system. This received due attention, but had no effect whatever on his emotional life. It is fitting and characteristic that in the edition of the Tucson newspaper giving an account of Dr. Briggs's death, under the heading, "Voice of the People," was a stirring letter from him to the Governor of Arizona, ending as follows:

I have never met Dr. —, but I have heard a great deal about his skill and intelligence in the care of the mentally ill, and of his knowledge of the requisites

for their care and treatment. In forcing Dr. — to resign because of insufficient appropriations, Arizona cannot but lose the respect of her sister states. This decision to tie the hands of a scientist and an expert should cause those responsible to hang their heads in shame. They have squarely turned their backs on the unfortunate sick of your state.

A. W. S.

MEDICAL EPONYM

BRAXTON HICKS MANEUVER

The maneuver for which John Braxton Hicks (1823–1897), assistant physician-accoucheur at Guy's Hospital, London, is remembered is that described below. The quotation is from a paper "On a New Method of Version in Abnormal Labour," which appeared in the *Lancet* (2: 28–30 and 55, 1860).

Introduce the left hand, with the usual precaution into the vagina, so far as to fairly touch the feet; head, even should it recede an inch. . . . Having passed one or two fingers (if only one, let it be the middle finger) within the cervix, and resting them on the head, place the *right* hand on the *left* side of the breech at the fundus uteri. . . . Employ gentle pressure and slight impulsive movements on the fundus towards the right side, and simultaneously on the head towards the left iliac fossa. In a very short time it will be found that the head is rising and at the same time the breech is descending. The shoulder is now felt by the hand in place of the head. . . . it in like manner is pushed to the left, and at the same time the breech is depressed to the right iliac fossa. The foetus is now transverse; the knee will be opposite the os, and, the membranes being ruptured, it can be seized . . . and brought into the vagina. . . .

I . . . shall for the present confine myself to the advantages this method gives us in *placenta praevia*—at least, in every form of partial insertion. . . .

. . . as soon as the finger can enter the os, it is practicable to bring down the knee or the foot, and by that means have the command of the haemorrhage and labour at the same time; for the conical form of this natural plug is just suited to the requirements of the case. By gentle traction on the limb, the os is completely and circularly filled up; and as it dilates the size of the plug, as it descends, increases, whereby a continuous pressure can be kept up, its force varying at will according to the requirements of the case. Having then secured this plug, by keeping hold of the limb, we can afford to wait till, on the one hand, the system has rallied to bear the completion of the labour; or till, on the other, the os has dilated to permit the evacuation of the foetus.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

THE ONE HUNDRED AND SIXTIETH ANNIVERSARY

Wednesday and Thursday, May 21 and 22, The Copley-Plaza, Boston

The exercises of the one hundred and sixtieth annual meeting of the Society will be held at The Copley Plaza, Boston, on Wednesday and Thursday, May 21 and 22. Members of the medical profession are cordially invited to attend.

The Committee of Arrangements in charge of this year's meeting consists of Drs Edward J O'Brien, chairman, William T O'Halloran, James A Halsted, George P Sturgis and Henry H Faxon.

With the exception of some of the section round table meetings and luncheons, all the meetings will be held in The Copley Plaza. The technical exhibits will fill the ball room and part of the foyer, whereas the scientific exhibits will take the balance of the foyer, the balcony boxes and the east corridor of the main floor. There will be a continuous exhibit of medical motion pictures in the State Dining Room.

The members' registration desk will be in the lobby, and it is hoped that everyone who attends will register.

The annual dinner and the Shattuck Lecture will be held on the same evening, Wednesday, May 21.

The golf tournament will be held at the Commonwealth Country Club on Wednesday, May 21.

Section round table meetings and luncheons will be held on Wednesday, May 21. As it is necessary to have, beforehand, some idea of the number who will attend these luncheons, all members are urged to notify the committee at once if they plan to come.

WEDNESDAY, MAY 21

General Clinical Meeting

9 15 to 12 00

SHERATON ROOM

Chairman Dr Bennett F Avery

9 15 *The Normal Needs and the Indications for Vitamin Therapy During Pregnancy* Dr Duncan E. Reid, Boston

9 30 *Vitamins in War* Robert S Harris, Ph D, Cambridge (by invitation)

9 45 *The Clinical Value of Vitamins* Dr William H Sebrell, Jr, Washington, D C

10 15 *Enlargement of the Heart* Dr Paul D White, Boston

INTERMISSION

10 45 *Lupus Erythematosus* Dr Richard S Weiss, St. Louis, Missouri

11 15 *Alcoholism a Problem on a Medical Service* Dr John A Foley, Boston

11 30 *Recent Advances in Chemotherapy of Infectious Diseases* Dr Chester S Keefer, Boston

11 45 *Some Uses and Abuses of Chemotherapy in Pneumonia* Dr Maxwell Finland, Boston

Supervising Censors' Meeting (PARLOR A) 10 00

Council Meeting (SWISS ROOM) 10 30

Nominating Committee (PARLOR A)

Cotting Luncheon (SWISS ROOM)
(following Council Meeting)

Section Round-Table Meetings and Luncheons

12 00 to 2 00

All round table luncheons will be \$1 00. Reservations should be made at once.

Section of Medicine

UNIVERSITY CLUB

Chairman Dr Albert A Hornor, Boston

Secretary Dr Charles L Short, Boston

Subject *The Use and Abuse of Drugs in Heart Disease*
Dr Paul D White, Boston

Section of Obstetrics and Gynecology

UNIVERSITY CLUB

Chairman Dr M Fletcher Eades, Newtonville and Boston

Secretary Dr Raymond S Titus, Boston

Subject *The Management of Bleeding in the Last Three Months of Pregnancy* Dr Frederick C Irving, presiding chairman

Section of Surgery

STATE SALON, THE COPLEY PLAZA

Chairman Dr R Nelson Hatt, Springfield

Secretary Dr Stanley J G Nowak, Boston

Subject *Fluid Administration in Surgery in the Light of Recent Advances in Water and Electrolytic Balance*
Dr John Scudder, New York City. Discussion by Dr Carl W Walter, Boston. Speaking begins at 12 45 p m.

Section of Pediatrics

HOTEL LENOX

Chairman Dr Harold L Higgins, Boston

Secretary Dr James M Baty, Belmont and Brookline

Subject *Symposium The conditioned reflex of Pavlov*
1 *Physiologic Status*

2. Practical Clinical Application, Especially to Children.

a. Gastrointestinal, urinary, respiratory and circulatory tracts.

b. Conditioned behavior.

Drs. Roy G. Hoskins, George E. Gardner and Harold L. Higgins, Boston.

Section of Dermatology and Syphilology

HOTEL LENOX

Chairman: Dr. William P. Boardman, Boston.

Secretary: Dr. Jacob H. Swartz, Boston.

Subject: *Treatment of Common Skin Diseases.* Dr. Richard S. Weiss, St. Louis, Missouri.

Section of Radiology and Physiotherapy

HOTEL LENOX

Chairman: Dr. Claude L. Payzant, Boston.

Secretary: Dr. Joseph H. Marks, Boston.

Subject: *Problems in the Management of Peripheral Vascular Disease.* Dr. Irving S. Wright, New York City.

Massachusetts Members of The New England Society of Anesthesiology

THE COPLEY-PLAZA

Presiding chairman: Dr. George C. Moore, Boston.

Subject: *Discussion of Anesthesia.*

General Clinical Meeting

2:00 to 5:00

SHERATON ROOM

Chairman: Dr. C. Sidney Burwell

2:00 *The Value of the Roentgen Examination in the Diagnosis of Intestinal Obstruction.* Dr. Eugene P. Pendergrass, Philadelphia.

2:20 *Indications for the Use of the Miller-Abbott Tube.* Dr. William O. Abbott, Philadelphia.

2:50 *Acute Intestinal Obstruction.* Dr. Leland S. McKittrick, Boston.

INTERMISSION

3:30 *Medical Organization.* Dr. Frank H. Lahey, Boston.

4:00 *Conservative Treatment of Occlusive Arterial Disease.* Dr. Irving S. Wright, New York City.

4:30 *Clinical Classification and Diagnosis of Hemorrhagic Diatheses.* Dr. William C. Moloney, Boston.

Annual Dinner (SHERATON ROOM)

7:00

The Shattuck Lecture (SWISS ROOM)

8:45

Thrombosis and Thrombophlebitis. Dr. Alton Ochsner, professor and director, Department of Surgery, Tulane University, New Orleans.

THURSDAY, MAY 22

Symposium on Hormones

9:00 to 10:45

SHERATON ROOM

Chairman: Dr. Charles E. Mongan

9:00 *Complications of Thyroid Substitution Therapy.* Dr. William T. Salter, Boston.

9:15 *The Treatment of Diabetics With Onset in 1941.* Dr. Elliott P. Joslin, Boston.

9:30 *Problems in the Recognition and Treatment of Testicular Insufficiency.* Dr. Allan T. Kenyon, Chicago.

10:00 *The Use of Female Sex Hormones in Disorders of Women.* Dr. George van S. Smith, Brookline.

10:15 *The Current Status of the Female Sex-Hormone Problem.* Dr. Roy G. Hoskins, Boston.

10:30 *The Place of Irradiation in Cancer of the Breast.* Dr. Frederick W. O'Brien, Boston, and Dr. Eugene J. McDonald, Boston (by invitation)

INTERMISSION

Annual Meeting (SHERATON ROOM) 11:00

Annual Discourse (following meeting): *The Role of the Physician in a Competitive Society.* Dr. A. Warren Stearns, Boston.

Annual Luncheon (SWISS ROOM) (following discourse)

Military Symposium

2:00 to 5:00

SHERATON ROOM

Chairman: Dr. Dwight O'Hara, Boston

2:00 *Anesthesia in War Circumstances.* Dr. Wesley Bourne, Montreal.

2:30 *Treatment of Compound Fractures Resulting from Enemy Projectiles.* Dr. Philip D. Wilson, New York City.

3:00 *The Problem of Fatigue in Aviators.* Ross A. McFarland, Ph.D., Boston (by invitation)

INTERMISSION

3:30 *Treatment of Gunshot Wounds of the Brain.* Dr. Gilbert Horrax, Boston.

3:50 *A Report of Newer Work on the Shock Problem.* Dr. Walter B. Cannon, Boston.

4:10 *War Neuroses.* Dr. Douglas A. Thom, Boston.

4:30 *Blood and Blood Substitutes in the Treatment of Hemorrhage, Secondary Shock and Burns.* Dr. Stuart Mudd, Philadelphia.

Motion Pictures

STATE DINING ROOM

Wednesday—May 21

- 9 30 *The Mechanism and Electrocardiographic Registration of the Heart in Health and Disease* (2 reels)
- 10 15 *The Complications of the Second Stage of Labor*
- 10 30 *Latzko Extraperitoneal Cesarean Section*
- 10 45 *The Treatment of Asphyxia Neonatorum*
- 11 15 *Epidemic Meningitis of Infancy*
- 11 30 *Bronchoscopy and Esophagoscopy on the Cadaver and the Living*
- 11 45 *Pentoneoscopy*
- 2 00 *Treatment of Burns*
- 2 30 *First Aid in Transporting Fractures of the Leg Spine and Arm*
- 2 45 *Technic of Blood Transfusion*
- 3 00 *Preparation and Preservation of Pooled Plasma*
- 3 15 *The Use of the Miller-Abbott Tube for Decompressing the Small Bowel in Certain Types of Intestinal Obstruction*
- 3 45 *Cholecystectomy and Choledochostomy*
- 4 00 *Perniciou Anemia*

Thursday—May 22

- 9 30 *The Relation of Absorbable Sutures to Wound Healing*
- 10 30 *Subtotal Thyroidectomy for Primary Hyperthyroidism*
- 10 45 *Diagnosis and Treatment of Infections of the Hand*
- 11 30 *Tests of Vestibular Function*
- 11 45 *The Administration of Oxygen by Oropharyngeal Catheter*
- 2 00 *Myasthenia Gravis The Erb-Goldflam syndrome*
- 2 15 *Vitamin B Complex Diagnosis treatment and results of cases of vitamin B deficiency (sound film)*
- 2 45 *Aftercare of Poliomyelitis*
- 3 15 *Technic for Cataract Operations (colored film)*
- 3 30 *Methods for the Determination of the Bleeding Tendency*
- 3 45 *Surgical Treatment for Tuberculosis of the Cecum by Resection with the Aseptic Basting-Stitch Technic*
- 4 00 *Hemorrhoids and the Method of Hemorrhoidectomy*
- 4 15 *Diagnostic Procedures in Tuberculosis*

Scientific Exhibits

FOYER

Booth

- A B *Tuberculosis Cancer* Massachusetts Department of Public Health

FOYER

- 66-67 *Myology* Department of Dermatology, Harvard Medical School and Massachusetts General Hospital Exhibitors Drs Jacob H Swartz and Ethel M Rockwood
- 68 *Chemotherapy in the Treatment of Infectious Diseases* Evans Memorial and Massachusetts Memorial Hospitals Exhibitors Drs Chester S Keefer and Charles H Rammelkamp
- 69 *Massachusetts Memorial Hospitals, Department of Surgery*
- a *Management of a Blood Bank* Exhibitor Dr Frank E Barton
- b *Experience with the Fenestration Operation in Otitis Media* Exhibitor Dr Leighton F Johnson
- c *The Use of a Vitallium Tube for Relief of Stricture of the Common Bile Duct* Exhibitor Dr Howard M Clute
- 70 72 *Tumor Clinic* Boston Dispensary Exhibitor Dr Paul R Hinchey and associates

BALCONY

- 1 *Color Photography in Medicine* Fallon Clinic, Worcester Exhibitor Dr John Fallon
- 2 *Broncho-esophagology* Massachusetts Eye and Ear Infirmary Exhibitor Dr Lyman G Richards
- 3 *Problems in Fractures* Faulkner Hospital Exhibitors Drs Gordon M Morrison and Harvey R Morrison
- 4 5 *Clinical Surgery* The Staff of the Children's Hospital Exhibitors Dr William E Ladd and associates
- 6 *The Visual Presentation of Case Histories for Publication and Teaching* Massachusetts General Hospital Exhibitor Miss Muriel McLatchie
- 7 *Boston Medical Library*
- 8 *The Lahey Clinic*
- a *Surgical Procedures in Complete Colectomy for Intractable Ulcerative Colitis* Exhibitors Drs Richard B Cattell, Neil W Swinton and Everett D Kiefer
- b *The Shoulder Joint Technic of surgical approach* Exhibitors Drs Gilbert E Haggart and James W Toumey
- c *Hematological Problems* Exhibitor Dr John W Norcross

EAST CORRIDOR

A C *Anesthesia*

- a *Advent of Anesthesia* Massachusetts General Hospital
- b *Suction Therapy in the Management and Treatment of Postoperative Pulmonary Complications* Lahey Clinic Drs Urban H Eversole and Carlton R Souders

- c. *Tovell's Technic for Parenteral Fluids*. Beverly Hospital.
- d. *Oxygen Therapy*. Massachusetts Memorial Hospitals.
- e. *Organization of a Hospital Anesthesia Department*. Faulkner Hospital.
- f. *Intravenous Anesthesia*. Boston City Hospital.
- D-E *Myasthenia Gravis: Recent advances in diagnosis and treatment*. Massachusetts General Hospital. Exhibitors: Drs. Henry R. Viets and Robert S. Schwab.
- F-G *Surgical Treatment of Arterial Hypertension*. Beth Israel Hospital. Exhibitors: Drs. David Ayman, Archie D. Goldshine and Reginald H. Smithwick.
- H *First Aid in Highway and Skiing Accidents*. Massachusetts Regional Committee on Fractures and Trauma, American College of Surgeons (Dr. A. William Reggio, chairman), Boston Metropolitan Chapter, American Red Cross, on Highway First Aid (Dr. A. William Reggio, chairman; Mr. George P. Johnson, director) and National Ski Patrol (Dr. Charles C. Lund and Mr. Robert Livermore, Jr.).

Additional Exhibit

BALLROOM

Massachusetts Association of Occupational Therapy.

Technical Exhibits

BALLROOM AND FOYER

	Booth No.
Abbott Laboratories.....	49
The Alkalol Company.....	36
American Hospital Supply Corporation	39
Ernst Bischoff Company, Inc.	9
The Borden Company.....	37
Brewer & Company, Inc.	13 and 14
Burroughs Wellcome & Co. (U. S. A.) Inc., New York.	30
Campbell X-Ray Corp.	20
The Children's House.....	61
Crosbie-Macdonald	22
The Coca-Cola Company.....	62 and 63
Davies, Rose & Company, Limited.....	3
The DeVilbiss Company.....	24
The Doho Chemical Corporation.....	18
The Dy-Dee Service.....	42
J. H. Emerson Company.....	27
H. G. Fischer & Co.	53
C. B. Fleet Co., Inc.	45
General Electric X-Ray Corporation.....	7
Gerber Products Company.....	6
J. E. Hanger, Inc.	11
Hanovia Chemical and Manufacturing Company.....	26
H. J. Heinz Company.....	5
Horlick's Malted Milk Corporation.....	32
Jones Metabolism Equipment Co.	31
Kalak Water Co. of New York, Inc.	10
Kleystone Rubber Co., Inc.	60
Lederle Laboratories, Inc.	43
Lee DeForest Laboratories.....	23
The Liebel-Flarsheim Co.	8

Eli Lilly and Company.....	144
M & R Dietetic Laboratories, Inc.	4
The Macmillan Company.....	19
E. F. Mahady Company.....	56
Massachusetts State Pharmaceutical Association.....	49
McIntosh Electrical Corporation.....	16
Mead Johnson & Company.....	1
The Medical Protective Company.....	43
Mellin's Food Company of North America.....	41
The Mennen Company.....	53
The C. V. Mosby Company.....	59
T. J. Noonan Company.....	64
Parke, Davis & Company.....	45
The E. L. Patch Company.....	17
Pet Milk Sales Corporation.....	54
Petrolagar Laboratories, Inc.	33
Philip Morris & Co. Ltd., Inc.	12
Picker X-Ray Corporation.....	52 and 59
Thomas W. Reed Company.....	33
S. M. A. Corporation.....	34
Schering Corporation.....	57
Sharp & Dohme, Inc.	65
Smith, Kline & French Laboratories.....	29
E. R. Squibb & Sons.....	15
Standard X-Ray Sales Corporation.....	25
Frederick Stearns & Company.....	47
The Sun-Ray Corporation.....	51
Surgeons and Physicians Supply Company.....	44
Tailby-Nason Company.....	21
Westinghouse X-Ray Company, Inc.	28
White Laboratories, Inc.	35
Winthrop Chemical Company, Inc.	55
John Wyeth & Brother, Inc.	2

LADIES' PROGRAM

For the ladies in the families of the members of the Massachusetts Medical Society, a most interesting program has been arranged by the Ladies' Committee, consisting of Mrs. Walter G. Phippen, Mrs. William T. O'Halloran, Mrs. Bennett F. Avery, Mrs. Theodore L. Badger, Mrs. Edmund J. Butler, Mrs. William Dameshek, Mrs. David C. Ditmore, Mrs. John G. Downing, Miss Mary L. Field, Mrs. Reginald Fitz, Mrs. John A. Foley, Mrs. Arthur J. Gorman, Mrs. Thomas H. Lanman, Mrs. Roger I. Lee, Mrs. Frederick J. Lynch, Mrs. Wilfrid C. Macdonald, Mrs. Frank W. Marlow, Jr., Mrs. Donald Munro, Mrs. Robert N. Nye, Mrs. Frank R. Ober, Mrs. Eugene E. O'Neil, Mrs. John W. Spellman, Mrs. Martin H. Spellman, Mrs. A. Warren Stearns, Mrs. Augustus Thorndike, Jr., and Mrs. Charles F. Wilinsky.

WEDNESDAY, MAY 21

All ladies should register at the desk in the main lobby of The Copley-Plaza. In the afternoon there will be a visit to the Isabella Stewart Gardner Museum, Fenway Court, including a tour of the museum, music, a reception and tea; admission to the museum is \$0.75. Busses will leave The Copley-Plaza at 2:15 p.m., and there will be no charge for transportation. Those wishing to play golf on Wednesday should make arrangements at the registration desk.

Dinner will be held at the Ritz Roof, Hotel Ritz Carlton, at 7:30 p.m. Mrs. Phippen, Mrs. Lee and the wives of the district presidents will meet the guests. During and after dinner there will be a floor show. The cost of the dinner tickets is \$2.50.

THURSDAY, MAY 22

The registration desk will be open from 9:00 a.m. to 12:00 m. At 10:00 a.m. busses will leave The Copley-Plaza on a most interesting trip to the South Shore. Stops will be made at the Dorothy Quincy House and the Adams Mansion, which was the home of two United States presidents, in Quincy. At Hingham, the Cushing Homestead, which was built in 1636, will be visited by invitation, and a stop will be made at the historic Old Ship Church. Luncheon will be served at Hugo's in Scituate at 1:30 p.m., for which a charge of \$1.00 will be made. The return trip will be made by way of Jerusalem Road, Cohasset. There will be no charge for transportation on this trip.

ANNUAL GOLF TOURNAMENT

The annual golf tournament of the Massachusetts Medical Society will be held at the Commonwealth Country Club on the afternoon of Wednesday, May 21.

The Burrage Bowl, emblematic of the Society championship, will again be in competition. Numerous other prizes will be offered for both net and gross scores.

Play will commence at 1:00 p.m., and the greens fee for eighteen holes will be \$2.00. If two or more rounds are played during the afternoon the fee will be \$2.50. State handicaps will be used.

Luncheon may be had at the club, and all the privileges of the club will be open to the members of the Society who enter the tournament. For additional information, telephone KENmore 2094 or a member of the Committee of Arrangements.

COMMITTEE ON POSTGRADUATE INSTRUCTION

There will be a luncheon and meeting of the district chairmen of the Committee on Postgraduate Instruction at The Copley-Plaza on Thursday, May 22, at 12:30.

MASSACHUSETTS MEDICO-LEGAL SOCIETY

There will be a meeting of the Massachusetts Medico-Legal Society in the State Salon at The Copley-Plaza on Wednesday afternoon, May 21, at 3:00.

SECTION OF OBSTETRICS
AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

TOXEMIA OF PREGNANCY, ASSOCIATED WITH
ECLAMPSIA AND RESULTING IN DEATH

A twenty-year-old primipara had been hospitalized in a state institution during the last four months of her pregnancy. Because of toxemia, labor was induced.

The family history and past history were not available. The patient was given adequate pre-

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

natal care after the fifth month, the urine and blood pressure being checked twice a week. Albumin did not appear until the thirty-second week, and edema appeared at the thirty-fourth week. At the twenty-second week, a blood pressure of 130 systolic, 75 diastolic, was recorded. The last week or so before induction of labor, the blood pressure was said to have gone up from 130 to 180 systolic.

Because the patient's condition was not improving, induction of labor was attempted. A catheter was inserted in the uterus and left in place for ten hours. Then, because labor had not begun, the membranes were ruptured and the cervix was packed. Six hours later, labor began. Thirty-six hours after the catheter was inserted, the patient had a severe convulsion and became unconscious. At that time the cervix was dilated to admit three fingers, and delivery was accomplished by manually dilating the cervix and applying high forceps. The fetus was dead. Ten minutes after the birth of the placenta, which was said to have been normal, the patient had a circulatory collapse and died an hour and a half later.

Comment. It is a general concept that a toxemia culminating in eclampsia and developing in a patient under constant observation during the last five months of pregnancy means only that the condition was not intelligently or adequately treated. There is no evidence in this case that there was any pelvic disproportion. Had there been any, cesarean section would have been the operation of choice. It is also possible that if there had been an appreciable rise in blood pressure occurring within twelve to twenty-four hours and a diminution of the urinary output, cesarean section again would have been indicated. Had one decided that induction was the best method of treatment, rupturing the membranes, treating the patient conservatively by the use of magnesium sulfate or veratrum viride to control the blood pressure and leaving the case absolutely alone after the membranes had been ruptured might well have resulted in a successful outcome. *Accouchement forcé* and high forceps are procedures that the unconscious eclamptic patient stands very poorly. Extreme vaginal conservatism should always be the rule.

Just what caused the circulatory collapse is hard to determine. It may well have been that the heart collapsed, either from shock or from the toxemia of the eclampsia; it is barely possible that the patient had a cerebral hemorrhage. These, however, are not very common. Unfortunately no autopsy was performed.

DEATHS

DEWEY—CHARLES G. DEWEY, M.D., of Dorchester, died April 18. He was in his eighty-second year.

Born in Hanover, New Hampshire, he attended Dartmouth College and received his degree from the Dartmouth Medical School in 1886. For four years he was assistant superintendent at the Boston City Hospital. From 1901 to 1934 he was examining physician of the mentally ill for the Institutions Department of the City of Boston, and he was associate commissioner of the Massachusetts Department of Mental Diseases from 1916 to 1934.

He was a member of the Massachusetts Medical Society, the American Medical Association and the American Psychiatric Association.

His widow, a son and two daughters survive him.

MELLEN—ELEANOR W. MELLEN, M.D., of Newton Highlands, died April 19. She was in her seventy-third year.

Dr. Mellen received her degree from the Woman's Medical College of Pennsylvania in 1903, and was a member of the Massachusetts Medical Society and the American Medical Association.

MURRAY—MICHAEL E. MURRAY, Jr., M.D., of Cambridge, died April 21. He was in his thirty-seventh year.

Born in Menominee, Michigan, he attended Notre Dame and received his degree from the Harvard Medical School in 1932. He was on the staff of the Massachusetts General Hospital, and was an assistant in the Hygiene Department of Harvard University.

Dr. Murray was a member of the Massachusetts Medical Society and the American Medical Association.

His widow and two small daughters survive him.

MISCELLANY

CITY HEALTH CONTEST AWARDS

Ten cities were named as 1940 winners of the Inter-Chamber City Health Conservation Contest conducted annually by the United States Chamber of Commerce in co-operation with the American Public Health Association; these include Newton, Massachusetts, and Hartford and Greenwich, Connecticut. Awards were also given in 1940 for the most effective programs for the control of tuberculosis and syphilis, the contest being sponsored by the Metropolitan Life Insurance Company; the two winners in the first group were Newton, Massachusetts, and Hartford, Connecticut.

AMERICAN MEDICAL GOLFING ASSOCIATION

The American Medical Golfing Association will hold its twenty-seventh annual tournament at the Cleveland Country Club and Pepper Pike Club in Cleveland, Ohio, on Monday, June 2. The two clubs have courses of championship caliber, and the clubhouse of the Cleveland Country Club is one of the most beautiful and spacious in the country.

More than 250 members of the association are expected to take part in the thirty-six-hole competition. The hours for teeing off are from 7:30 a.m. to 2:00 p.m. The fifty prizes in the eight events will be distributed after the banquet, which will be held at the clubhouse of the Cleveland Country Club at 7:00 p.m.

All male members of the American Medical Association

are eligible and cordially invited to become members of the association; applications may be obtained from the executive secretary, Bill Burns, 2020 Olds Tower, Lansing, Michigan. Each participant in the tournament is required to present a card with his home-club handicap, signed by the club secretary, at the first tee on the day of play. No handicap over 30 is allowed. Only active members of the association may compete for prizes. No trophy is awarded to a member who is absent from the annual dinner, which is always worth waiting for.

WOMAN'S AUXILIARY, AMERICAN MEDICAL ASSOCIATION

On June 2 to 6 the Woman's Auxiliary to the American Medical Association will hold its nineteenth annual convention at Cleveland. Hotel Carter will be the headquarters. The wives of all physicians who are members of the American Medical Association and their friends are invited to attend the meetings. Requests for reservations should be sent to Dr. Edward F. Kieger, Committee on Hotels and Housing, 1604 Terminal Tower Building, Cleveland.

VINCENT MEMORIAL HOSPITAL

Plans have recently been announced for the affiliation of the Vincent Memorial Hospital and the Massachusetts General Hospital. The present building of the Vincent Memorial Hospital on South Huntington Avenue, Boston, will be sold, and a new building, still called the Vincent Memorial Hospital, will be built on the grounds of the Massachusetts General Hospital. Dr. Joe V. Meigs, chief-of-staff at the Vincent Memorial Hospital, and the other physicians on the staff will continue to serve, and Dr. Meigs will be made head of a newly established gynecological unit at the Massachusetts General Hospital. At the meeting of the Vincent Club—an effective supporter of the Vincent Memorial Hospital—at which this announcement was made, Mr. Charles Francis Adams said that the affiliation was "a step forward in efficiency, a step forward in good management and a step forward in service to the community."

NOTES

Dr. Henry K. Beecher, associate in anesthesia, Harvard Medical School, has been appointed to a professorship at the Medical School to fill the Dr. Henry Isaiah Dorr Chair of Research and Teaching in Anaesthetics and Anaesthesia.

Dr. Israel Kapnick, '38, of Providence, Rhode Island, has been awarded the Louis E. Kirstein Fellowship at the Harvard Medical School for the summer of 1941. The fellowship, to promote "scientific medical education," was established through a gift of \$28,550 made to Harvard University by eighty-nine friends of Mr. Kirstein.

CORRESPONDENCE

TUBERCULOSIS AND GENIUS

To the Editor: In the March 6 issue of the *Journal* there appeared a review of the book, *Tuberculosis and Genius*, by Dr. Lewis J. Moorman. That review, in my opinion, not only was unkind and unfair, but also did grave injustice to Dr. Moorman and his work.

About half the space given to the book review was occupied by a harangue about the various abuses of present-day management of tuberculosis sanatoriums.

which was not only unwarranted in the light of facts, but was entirely missing the mark so far as Dr Moorman's book is concerned, since none of the characters considered in the biographical sketches came under strictly modern management. I shall not say anything here about such unfortunate expressions used by the reviewer, such as 'victims of tuberculosis' herded together, forced to submit to the tyrannical rules of community life and abnormal conditions imposed upon them. Who has ever relegated tuberculous patients among the morons or exalted them to the rank of geniuses? Who has branded them as dissolute erotics or beatified them as angels of chastity? It is true that a London physician, Dr Gwilym, once proposed castration as a method of treatment for pulmonary tuberculosis. But that was in 1857. Strong objections being raised, he desisted. As to clinicians who feel 'the urge to become amateur psychiatrists,' I think that chest specialists are perfectly justified in studying their patients as best they can in that respect and in noting carefully their emotions, reactions and adjustments during the course of their disease. All that, however, has nothing to do with Dr Moorman's book.

Are the diagnoses made by Dr Moorman correct? Is there a relation between tuberculosis and genius? And, if there is, what is the nature of that relation? Those are the questions raised by Dr Moorman's essays.

To make a retrospective diagnosis on a person dead long ago is not any different than to study any other point of history, and the two should be governed by the same rules. All the records extant should be carefully and critically examined before conclusions are drawn. Now, everyone familiar with the study of history knows that, even when all the evidence has been gathered, it is very often impossible to arrive at deductions that are certain, positive and final. One must often content oneself with conclusions that are *most probable*, or only *probable*, or simply *possible*. The same holds true of a diagnosis. If I must show that a man has had a positive sputum before I can call him tuberculous, then none of Dr Moorman's characters had tuberculosis. Nobody had tuberculosis before Koch discovered the bacillus. Did Stevenson have it? I must doubt it even if all the rest of the evidence points toward it, because, if I am not mistaken, Trudeau failed to examine Stevenson's sputum when he took the latter to his laboratory.

The fact that all the diagnoses made by Dr Moorman can be questioned is not Dr Moorman's fault. It is the fault of history. History is not an exact science, like mathematics, and never will be. It deals with human beings, and its conclusions are never definitive and can always be questioned. For example, historians all over the world have not arrived yet at a positive and certain conclusion about the true cause of World War I. Likewise the man interested in medicohistorical studies has to be satisfied with diagnoses that are sometimes only probable, sometimes only possible.

The reviewer contends that Dr Moorman's excursions into history and his diagnoses are based on assumptions. Not at all. They are based on the available records. Has Dr Moorman examined *all* the available records? That is what should have been discussed. The book should have been studied like a book of history, with the methods of the historian. The reviewer has failed to do that. More than that after claiming that Dr Moorman walks on very thin ice he himself goes out on thinner ice, and proposes, for Voltaire, a diagnosis of bronchiectasis. There are at least thirty different medicohistorical studies about Voltaire's health, his diseases and his last illness. If

there is a diagnosis that is *most improbable*, it is that of bronchiectasis.

What is the relation between tuberculosis and genius? That question calls for another and more inclusive one. What are the relations between the body and the mind? Genius is only the mind working in a superlative way. It is a truism to say that the body and the mind are closely interrelated and that states of mind are often dependent on states of body and, conversely, that bodily changes often follow mental changes. It is not the place here to inquire into the modifications wrought on the mind and the personality by changes in the secretions of the endocrine glands, by chronic infections, by intoxications of long duration and by other factors. But let us take one example: the thyroid gland. We all know the mental changes that take place when the secretions of this gland begin to decrease: slowness, dullness, apathy. If the function of the gland continues to slow up, we may have actual cretinism. The reviewer says that genius transcends contingencies. If suffering from the most disabling form of tuberculosis for years is a contingency, then having a thyroid gland that does not secrete is also a contingency. I should like to see a genius transcend that one!

Let us take another example. A composer of talent, or of genius, is occupied in writing a symphony. In the course of the creation of that symphony, a virulent, destructive tuberculous process invades one of his lungs and destroys it. Who will say that the style of his music will not be affected by what is going on in his chest?

Dr Moorman never claimed that tuberculosis is the cause of genius, or gives genius to a man, or adds to the genius of a man. Is there anything more evident and obvious than the fact that having tuberculosis does not presuppose having genius? I feel a little sympathy for Dr Moorman. I myself, some time ago, in an article about a man who had had tuberculosis, asked, merely asked, if there was not some relation between tuberculosis and the creative mind. Another book reviewer and his prompter tried to have me say that tuberculosis was a causative factor in the production of genius.

The reviewer denies that there is any relation between tuberculosis and genius, but he is willing to admit that the 'artistic temperament' can be influenced by syphilis. He does not demonstrate it, however. When he has succeeded in demonstrating that syphilis can influence an artist, he will have demonstrated that tuberculosis can also influence an artist. The reviewer shows confusion on another point. I put side by side two sentences from his review: 'Knowing the artistic temperament, one may be permitted to suggest the existence of a sprinkling of spirochetes. And, 'To tell them that the creative power of genius is enhanced by the toxins of such or such a germ would seem to be unjustifiable.' Isn't there contradiction here?

As to Balzac, DeQuincey and Poe having written beautifully without coffee, opium and alcohol, that is not the question. The question is, Would they have written what they wrote as they wrote it, without coffee, opium and alcohol? A man of genius is born with his genius. The manifestation of his genius is conditioned and determined by several external factors, among which are the development of his body, his health, his diseases and so forth.

To conclude I think that Dr Moorman should be congratulated. A man who has had long experience in tuberculosis work, he has written a most interesting book about a certain aspect of tuberculosis. It is not a work of eru-

dition or research. It was not intended to be one. It is a captivating study of the lives of ten men and women handicapped by a long debilitating illness. In the words of Dr. Max Pinner, who has written, in my opinion, the best and most sympathetic review of Dr. Moorman's book, it should "reach many patients and many physicians . . . it will teach physicians a deeper sympathy and understanding for their charges . . . it belongs in the patients' library of every tuberculosis ward." The National Tuberculosis Association has recognized the value of the book and has selected it for distribution among its members.

GABRIEL NADEAU, M.D.

Rutland State Sanatorium,
Rutland, Massachusetts.

PHARMACEUTICAL ADVERTISING

To the Editor: The editorial in the March 13 issue of the *Journal* that deals with vitamins is very interesting, since it tells the medical practitioner that he has given over, perhaps by force, his therapy to the purveyors of proprietary preparations—in this case, vitamins.

Every line in the editorial is full of truth, and if the average physician is anxious to keep away from the poor-house where he is gradually being forced by many unethical so-called "ethical" houses, he should do what I have been doing in the last seven years.

I do not prescribe anything manufactured or distributed by a concern that advertises its products in a publication that is read by the general public, since it is my belief that such an act on the part of the manufacturer or distributor constitutes the illegal practice of medicine and is thus an interference with the livelihood of the legitimate practitioner. There are a few manufacturers who do not advertise to the general public, nor do they furnish display signs for the use of counter-prescribing druggists. It is therefore the duty of the average physician to confine his prescribing to articles of these manufacturers. By doing this the physician will be able to preserve his own practice and will at the same time aid those who are helping him.

A. PRAGLIN, M.D.

26 Davis Street,
Boston.

REPORTS OF MEETINGS

HARVARD MEDICAL SOCIETY

A regular meeting of the Harvard Medical Society was held at the Peter Bent Brigham Hospital on January 14, 1941, with Dr. Joseph C. Aub presiding.

The first case was that of a forty-one-year-old man who had entered the hospital three months previously because of epigastric and left-upper-quadrant distress. A gastrointestinal series revealed a carcinoma of the upper end of the stomach, and total resection was subsequently carried out, with smooth convalescence. Roentgenographic studies eleven days postoperatively revealed a well-functioning stoma; when the patient was discharged he was asymptomatic. A month later the patient was bothered by heartburn, for which dilute hydrochloric acid and antacid powders were administered, with relief in a week. A recurrence of these symptoms in another ten days was not amenable to this therapy, and the patient also began to be bothered by regurgitation, particularly of saliva. He voluntarily started on a soft-solid diet without relief but with the loss of 15 pounds in weight until the present admission. Physical examination, the blood chemical

findings and a gastrointestinal series were negative except for some abnormality of swallowing during the last test. This was not true regurgitation but largely difficulty in swallowing saliva. Atropine in doses of 0.6 mg. daily caused a decrease in the amount of saliva, and 10 units of insulin three times daily improved his failing appetite. No sympathetic symptoms were present, nor was the salivation associated with nausea.

Dr. E. S. Emery suggested that radical gastric surgery may often be associated with autonomic symptoms resulting from an accentuation in a susceptible person of an underlying autonomic imbalance. These manifestations may take the form of sweating, dizziness or an elevation of blood pressure after meals. Dr. Robert Zollinger stated that the much-discussed problem of anemia seldom develops, whereas diarrhea or obstruction due to a poorly functioning stoma is quite frequent. This was the first case of salivation, and one other patient experienced postprandial rhinitis. Dr. Arturo Rosenbluth expressed surprise that atropine did not have a better effect. He stated that abnormal afferent impulses might explain the phenomena. The rate or even presence of regrowth of afferent fibers following gastric resection is an unknown quantity.

The medical case was that of a fifty-nine-year-old man who entered the hospital because of weakness and unsteadiness of his legs for several weeks. Several years previously he had had gonococcal urethritis, which had been "cured" by local treatment. One year before entry weakness and lameness of the lower extremities were first noted. Five weeks before entry he realized that the heat of a stove was not felt with his left hand, and he began to have poor control of finer movements and speech. Blood and cerebrospinal-fluid Wassermann tests were positive at an outlying hospital. Neurologic examination on entry revealed hyperactive tendon reflexes, a positive Hoffmann sign bilaterally, and poor position sense and heel-to-shin test. There was an elevated sedimentation rate. The cerebrospinal fluid revealed a positive Wassermann reaction and a first-zone gold-sol curve. The blood Wassermann reaction was negative three times and positive twice. Bismuth and neoarsphenamine therapy was instituted. Dr. John Romano suggested that the unusual combination of signs was due to a lateral medullary thrombosis superimposed on a diffuse syphilitic meningoencephalitis.

The speaker of the evening was Dr. Rosenbluth, his subject being "A Physiologic Analysis of Abnormal Neuromuscular Function." Dr. Rosenbluth defined neuromuscular disorders as a "deficiency in the performance of motor function due to a lesion below the motor neurone." He stated that the purpose of his address was an attempt to classify such disorders on a physiologic rather than the usual morphologic basis, and to propose some tests for the approval of the clinician.

As an introduction, the speaker showed a schematic plan of the neuromuscular response in which a nerve impulse sets free a quantum of acetylcholine, which causes a muscle impulse (similar in nature to a nerve impulse); this, in turn, results in a contractile response, which is the clinical but not the physiologic end point. The latter involves the inactivation of acetylcholine by cholinesterase, which is found at the site of release and causes a breakdown into acetic acid, inactive choline and a recovery process. It was pointed out that an identical response can be brought about in what is termed a "contracture" when acetylcholine exerts its effect directly without a muscle impulse.

The mechanism whereby acetylcholine causes a muscle

impulse was then discussed. In any nerve-muscle preparation, there is a threshold below which acetylcholine produces no response, but there is also an upper limit to the effective range above which this substance becomes paralytic. Usually there is only a single response to a given amount of acetylcholine because cholinesterase causes so rapid a breakdown that the level of mediator is subthreshold by the time the muscle ceases to become refractory. The failure of a muscle to respond in any case may be due to an elevated threshold in the presence of a normal amount of acetylcholine (curare), or to a diminished amount of acetylcholine in cases in which the threshold remains essentially normal (certain types of fatigue). In Wallerian degeneration the transmission of nerve impulses proceeds for some time before suddenly ceasing. Here the nerve impulses remain normal, but the acetylcholine output eventually falls below the threshold value and responses cease.

The paralytic range of acetylcholine can be demonstrated experimentally by neutralizing cholinesterase with eserine. In this case there is no breakdown of acetylcholine, and a summation of the substance results from repeated stimulations. Therefore, a curare and eserine may achieve the same result by entirely different mechanisms and it becomes clinically important in a given case of neuromuscular dysfunction to know which type of paralysis is present, for adding acetylcholine aids the first condition but merely aggravates the second.

Dr Rosenbluth then discussed so-called 'fatigue'—a poorly defined physiologic as well as clinical term. High rate stimulation (60 per second) of a nerve-muscle preparation results in fatigue of transmission because of too little acetylcholine. Stimulation at a slow rate (2 to 4 per second), on the other hand, causes contractile fatigue. Here the response, no matter how far diminished, never entirely disappears, in contrast to the previous type of fatigue. Transmission is intact, but there is a depression of the contractile system.

A classification of clinical neuromuscular disorders is suggested on this physiologic basis. Under 'hypodynamic' effects would be classified atonia, ataxia, fatigue and paralysis. These might be due to transmission defects in which acetylcholine is either below the threshold level or above the paralytic level, or they might result from an impairment of the motor system in the muscle itself. On the opposite side would be the 'hyperdynamic' conditions such as convulsions, spasm, myoclonia and myotonia. Such conditions might be due to nerve changes such as can be caused by veratrine¹ when the responses of nerve become repetitive, changes in transmission (possible but improbable), when the action of acetylcholine may be prolonged within the effective range, and dysfunction of the contractile mechanism whereby the response to a given stimulus is greater than normal.

Finally Dr Rosenbluth suggested certain clinical tests that he considered applicable to neuromuscular disorders to determine the site and type of pathologic physiology. To decide whether a disease is central or peripheral the carrying out of novocain block and the stimulation of the nerve at various frequencies peripherally to the block, the study of the acetylcholine thresholds of normal and neurologic patients, the administration of eserine to determine whether there is improvement or aggravation of symptoms and signs, the use of subparalytic doses of curare, biopsy and cholinesterase-content determinations of muscle and of blood—these may be difficult to interpret, owing to the heterogeneous distribution of the enzyme in muscle.

The discussion was inaugurated by Dr John Romano whose only question concerned the variable effects of

quinine obtained in myotonic conditions and the physiologic basis for these effects. Dr Rosenbluth replied that this drug is now known to be similar to curare in certain respects and to eserine in others. Therefore, complicated reactions may ensue, and the end results depend on the original balance in the neuromuscular system.

Dr Henry R. Viets, acknowledging the desirability for improved clinical tests in neuromuscular disorders, advanced certain practical objections to the speaker's suggested tests. In the first place, there are too few peripheral nerves available for stimulation. Cholinesterase is difficult to detect and quantitate in the situations in which it is desirable. It is impractical to treat with acetylcholine, owing to its ready destruction in the body. In regard to treatment of some of these disorders, Dr Viets stated that prostigmine and other anticholinergic drugs seem to be all right clinically. In Thomson's disease there appears in most cases to be improvement with quinine and aggravation of the clinical picture with prostigmine. The important relation of endocrinology to the entire group of neuromuscular disorders was emphasized, and Dr Viets reminded the audience that the first description of myasthenia gravis recommended pregnancy as a cure.

In reply, Dr Rosenbluth suggested that the easily accessible ulnar nerve be used for stimulation on the basis that there is probably generalized neuromuscular involvement, even in such seemingly localized conditions as myasthenia gravis and scapulohumeral muscular atrophy. Dr Viets agreed with the probability of generalized subclinical involvement and the feasibility of ulnar stimulation.

Dr William T. Greene suggested that the neuromuscular mechanism in the clinic is not so simple as in the physiology laboratory and that secondary responses often overshadow or complicate primary reactions, particularly when the central nervous system is involved. Dr Aub asked how often plumbism with poor re-creation of phosphocreatine may cause neuromuscular dysfunction. Dr Rosenbluth replied that this probably is not rare.

JEWISH MEMORIAL HOSPITAL

A regular meeting was held at the Jewish Memorial Hospital on February 27, with Dr Samuel A. Levine discussing 'Common Errors in the Diagnosis of Cardiac Conditions'. It was pointed out that heart disease is one condition in which the diagnosis is almost all important, for the treatment is usually easy or at least easy to determine. Furthermore, the treatment of heart disease is generally good, especially in large medical centers, but this is not so of diagnosis. An important and common error is the diagnosing of heart disease when none is actually present, for the patient may thus be condemned to a life of inactivity and the use of powerful drugs. To make a positive diagnosis of organic heart disease, which is not necessarily the same as heart failure, one should rely on the three cardinal signs: a diastolic murmur, cardiac enlargement and gallop rhythm. A diastolic murmur invariably means heart disease until proved otherwise, but the observer must be able to distinguish what is diastolic. Although enlargement usually indicates organic heart disease, it may occasionally be reversible and reparable, as in beriberi. Gallop rhythm, except for the rare normal systolic type, is an indication of serious cardiac damage. Other findings are usually present in heart disease but do not necessarily incriminate the organ, whereas a significant number of cardiac patients do not have any of these findings. In angina pectoris the three cardinal signs may well be absent. Here

the symptoms are important, and an accurate history is the *sine qua non*. In the absence of characteristic history all accessory diagnostic aids may need to be employed, such as studies of the pulmonary and biliary systems. Dr. Levine emphasized that apical pain is usually not coronary in origin.

If heart failure is present, the kind and amount of heart disease is not important when the treatment is the same. But one should keep looking for those rare conditions that can be cured and in which the treatment differs from the usual regimen of digitalis and diuretics. The classic examples of this are the masked thyrocardiacs for the proper diagnosis can rehabilitate a patient who might otherwise be considered hopeless. Although such people may on the surface appear perfectly normal, certain important clues indicate the true etiologic factor underlying the cardiac condition. The skin may be moist, pigmented and hyperemic; the heartbeat may be hyperactive, snappy and agile, compared to the thrusting impulse of other cardiac enlargement; there may be signs of thyrotoxicosis, such as weight loss with a good appetite, an elevated metabolic rate and a diminished cholesterol level. Dr. Levine warned that heart failure alone may give an elevated metabolic rate. An increase in the velocity of blood flow as measured by the circulation time clinches the diagnosis in the presence of congestive failure, which in all other conditions decreases the rate.

One of the most important factors in establishing a proper basis for cardiac therapy is the intelligent interpretation of signs and symptoms. Heart failure rather than heart disease should be treated, for organic disease is usually present about five times as long as failure, and early therapy is of no avail. One of the important manifestations of the failing heart is dyspnea. Here one must distinguish the shortness of breath due to obesity, bronchitis, anemia, asthenia and neurotic overventilation. Cardiac treatment does not help these conditions, and in any case should be omitted if there is not symptomatic relief. An obese person may later develop heart disease with dyspnea, but this does not indicate that previous dyspnea was cardiac in origin. Important aids in this differential diagnosis are the vital capacity and the circulation time. Dyspnea with a normal vital capacity is not heart disease. The circulation time is increased in cardiac conditions over those of pulmonary origin. Naturally, roentgenograms are of inestimable value.

A second sign of failure is rales, which should be moist and basal in comparison with the rhonchi and crepitant rales of pulmonary disease. Anterior and expiratory rales usually indicate respiratory disease. Pulmonary carcinoma may cause both dyspnea and rales, and although the proper diagnosis may not always be made, one can reassure one's consultant that the condition is not cardiac.

Edema, a third sign of failure, may be caused by increased pelvic pressure with varicose veins, nephritis and low total-protein values. The last condition may confuse the issue by being the sole cause of edema in a known cardiac patient. Since the blood volume is increased in all cardiac congestions, this may help in differentiating the edema of nephritis.

Finally, the enlarged liver of cardiac failure must be distinguished from carcinoma and cirrhosis, either of which may well occur in the presence of such conditions as hypertension. The elevation of venous pressure found in cardiac conditions is often a helpful differential point.

Dr. Levine cited additional helpful clues in the diagnosis of cardiac conditions. Women do not have coronary disease without hypertension except rarely later in life, but men may. Anginal pain is usually substernal but not

lengthy or usually present in recumbency, in contrast to aneurysm. Left-axis deviation is a common finding in patients over forty years of age, especially when there is a high diaphragm, and should therefore not be considered significant in itself. It was stated that the electrocardiogram may be helpful in diagnosis but should not be used for prognosis in the individual case. This is borne out by the fact that although an inverted T wave in Lead I usually indicates a bad prognosis, there may be occasional exceptions. Emphysema should always be considered, since it is a common cause of exertional dyspnea, rales and distant heart sounds. If rales are unilateral, they are usually at the right base in cardiac conditions.

Finally Dr. Levine re-emphasized the importance of searching for those reversible conditions that may be cured, for although each type may be rare, the total number of cases may be appreciable. Remedial arrhythmias alone may cause heart failure in a small group of patients. Arteriovenous aneurysms anywhere in the body may cause eventual cardiac failure by overwork even in an originally normal heart. These are often traumatic in origin, and are accompanied by a steady machinery murmur. Surgical results in such cases are usually strikingly effective. Then there is the beriberi heart, which is so effectively cured by appropriate vitamin therapy. And surgery may bring about a cure in constrictive pericarditis. The three questions that should be asked in any case, therefore, are: Is there heart disease? Is there heart failure? Is there heart failure for which specific therapy is available?

NOTICES

ANNOUNCEMENT

DR. A. W. GASSON announces the removal of his office from 937 Washington Street, Norwood, to 34 North Main Street, Mansfield.

BOSTON LYING-IN HOSPITAL

There will be a meeting of the Journal Club of the Boston Lying-in Hospital on Wednesday, May 7, at 8:15 p.m. in the lecture room of the hospital. Dr. Alan F. Guttmacher, associate professor of obstetrics, Johns Hopkins University School of Medicine, will speak on "Multiple Pregnancy: Certain historical, biological and clinical aspects."

Physicians and medical students are cordially invited to attend.

HARVARD MEDICAL ALUMNI ASSOCIATION

The annual meeting and dinner of the Harvard Medical Alumni Association will take place on Wednesday, June 4, at 7 p.m. at the Hermit Club, Cleveland, during the annual session of the American Medical Association. The speakers will be Dean C. Sidney Burwell, Dr. Frank H. Lahey, Dr. Roger I. Lee and Dr. Philip D. Wilson.

ANNUAL CONCERT OF THE BOSTON DOCTORS' SYMPHONY ORCHESTRA

The Boston Doctors' Symphony Orchestra will give its second annual concert on Sunday, May 11, at 8:15 p.m. in Jordan Hall. Alexander Thiede will conduct. Dr. Werner Mueller will appear as soloist.

Proceeds of the concert will be used for the establishment of a fund for a free bed in each of the following

hospitals: Beth Israel Hospital, Children's Hospital, Massachusetts Eye and Ear Infirmary and Boston Dispensary. Tickets at \$1.00 may be obtained by applying to Dr. Julius Loman, Pelham Hall Hotel, Brookline (BEA 2430).

NORFOLK DISTRICT MEDICAL SOCIETY

The ninety-first annual meeting of the Norfolk District Medical Society will take place on Tuesday, May 6, at the Hotel Puritan, Boston.

PROGRAM

6 p.m. Business meeting.

7 p.m. Dinner.

Colonel Charles W. Furlong, explorer, lecturer and writer, will speak.

Reservations for the dinner should be made by Saturday noon, May 3, and should be sent to Dr. Frank S. Cruickshank, secretary, 1247 Beacon Street, Brookline.

WACHUSETT MEDICAL IMPROVEMENT SOCIETY

The next meeting of the Wachusett Medical Improvement Society will be held at the Holden District Hospital on Wednesday, May 7, at 6:30 p.m.

PROGRAM

Clinicopathological conference.

A medical case. Drs. I. L. Cutler, J. J. Dumphy and A. R. Crane.

A surgical case. Drs. John Fallon and William Freeman.

NATIONAL GASTROENTEROLOGICAL ASSOCIATION

The sixth annual convention of the National Gastroenterological Association will be held at Hotel Commodore, New York City, May 13 to 16. May 15 has been designated New England Day, and many of the speakers will be from this district. Dr. Frank H. Lahey will address the meeting in the afternoon and will be the speaker at the banquet that night. Other New England speakers include Drs. Carl Bearse, Louis F. Curran, Herbert G. Dunphy, E. Stanley Emery, Jr., Charles A. Lamb, Charles W. McClure, William R. Morrison, George Papen, Richard H. Sweet, and Norman A. Welch, of Boston; Drs. Frank A. Cummings, Frederic V. Hussey and E. Ashlev Shaw, of Rhode Island, and Dr. Robert F. Scholl, of Connecticut.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, MAY 4

- MONDAY, MAY 5**
12:15-1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.
- TUESDAY, MAY 6**
*9:10 a.m. Pneumoencephalography. Dr. Kurt Goldstein. Joseph H. Pratt Diagnostic Hospital.
12:15-1:15 p.m. Clinicoradiologic conference. Peter Bent Brigham Hospital amphitheater.
- WEDNESDAY, MAY 7**
*9-10 a.m. Utericaria. Dr. E. A. Brown. Joseph H. Pratt Diagnostic Hospital.
*12 m. Clinicopathological conference. Children's Hospital.
*5:15 p.m. Multiple Pregnancy. Certain historical, biological and clinical aspects. Dr. Alan F. Guttmacher. Journal Club. Boston Lying in Hospital.

- THURSDAY, MAY 8**
*9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.
- FRIDAY, MAY 9**
*9-10 a.m. Marked Hyperthyroidism. Dr. Oliver Cope. Joseph H. Pratt Diagnostic Hospital.
- SATURDAY, MAY 10**
*9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.
- *Open to the medical profession

- May 2—Henry Jackson Lecture. Page 752, issue of April 24
May 5-9—American Association of Industrial Physicians and Surgeons and American Industrial Hygiene Association. Page 484, issue of March 13
May 7—Wachusett Medical Improvement Society. Notice above
May 8—Pentucket Association of Physicians. Page 263, issue of August 15
May 11—Boston Doctors' Symphony Orchestra. Second annual concert. Page 790
May 12-14—American Association for the Study of Gout. Page 753, issue of April 24
May 13-16—National Gastroenterological Association. Notice above
May 14—New England Obstetrical and Gynecological Society. Page 752, issue of April 24
May 21—Massachusetts Medical Legal Society. Page 785
May 21, 22—Massachusetts Medical Society, Boston. Page 781
May 28-June 2—American Board of Obstetrics and Gynecology. Page 262, issue of February 6
May 29-31—Medical Library Association. Page 671, issue of April 10
May 30-June 2—American Heart Association. Hotel Statler, Cleveland
May 30-June 2—American College of Chest Physicians. Hotel Statler, Cleveland
June 2—American Medical Golfing Association. Page 785
June 2-6—American Medical Association. Cleveland
June 2-6—Woman's Auxiliary. American Medical Association. Hotel Carter, Cleveland
June 4—Harvard Medical Alumni Association. Page 790
June 22-24—Maine Medical Association. Marshall House, York Harbor, Maine
October 14-17—American Public Health Association. Page 579, issue of March 27

DISTRICT MEDICAL SOCIETIES

- ESSEX NORTH**
May 7—Page 708, issue of April 17
- ESSEX SOUTH**
May 14—Relation of the Doctor to the Law. Mr. Leland Powers. New Ocean House, Swampscott
- FRANKLIN**
May 13—This meeting will be held at 11 a.m. at the Franklin County Hospital, Greenfield
- MIDDLESEX SOUTH**
May 14—Page 752, issue of April 24
- NORFOLK**
May 6—Notice above

- WORCESTER NORTH**
April 23—Eighty second annual meeting. Page 709, issue of April 17.

BOOK REVIEWS

Social and Biological Aspects of Mental Disease. By Benjamin Malzberg, Ph.D. 8°, cloth, 360 pp., with 170 tables and 19 graphs. Utica, New York: State Hospitals Press, 1940. \$2.50.

In this book the author publishes a series of papers written during the last several years. It is a very valuable contribution to the subject of psychiatry and provides a large mass of basic data for psychiatrists and students of mental disorders. Dr. Malzberg believes that the increase in patients on the books of the New York State

hospitals between 1909 and 1935 indicates an increase in mental disease in that state. The larger number of patients thus revealed might be due to an increasing length of hospital stay or to changes in parole criteria that would increase the number of patients on the books.

The chapter, "Age and Mental Disease," is very interesting and gives a number of graphs presenting the rate distribution for various psychoses. A chapter on environment brings out the fact that mental disease in patients from urban areas is very much higher than in patients from rural areas. The chapter on marital status shows that the married population had much lower rates of mental disease than any of the other groups. Foreign-born persons showed the higher admission rate for mental disease (108 per 100,000) and the native-born a lower rate (91 per 100,000). In a chapter entitled, "Race and Mental Disease," the writer shows the age ratios and psychoses in Italians, Germans, Irish, English, Scandinavians and Negroes. Studying mental disease in relation to birth order, the author found no evidence that the first-born children are at a disadvantage so far as the appearance of a mental disorder is concerned. In studying economic status, it was found that unskilled workers appear to have the highest rate for mental disease. Illiteracy was also found to be related to high admission rates.

This volume makes a valuable addition to the literature of psychiatry and will probably be used as source material for some years to come. Oddly enough, its material parallels the data for Massachusetts published the same year by Dr. Neil A. Dayton.

Psychiatric Clinics for Children, with Special Reference to State Programs. By Helen Leland Witmer, Ph.D., Smith College School for Social Work. 8°, cloth, 437 pp. New York: The Commonwealth Fund, 1940. \$2.50.

This book provides information for those interested in child-guidance clinic services. For the last nine years the National Committee for Mental Hygiene, through members of its field staff, has been conducting an evaluation of programs that offer this service throughout the country. The philosophy, the practice, the objectives and the achievements of clinical child psychiatry are studied. The results of this analysis, covering several years, are presented in this volume.

Part I describes the background of clinical child psychiatry in the United States. Part II discusses clinics financed by state governments, and evaluates typical policies. Part III suggests that the present difficulties of such clinics are traceable to lack of well-defined objectives and examines the alternative possibilities. The book ends with a list of basic requirements that, the author believes, must be met if a program of clinical psychiatry is to be successful.

The author is evidently thoroughly convinced of the superiority of the classic child-guidance clinic as developed in New York. The habit clinics, as developed in Massachusetts by Dr. Douglas A. Thom, and the traveling psychiatric school clinics, initiated by the late Dr. Walter E. Fernald, are discussed but briefly. The latter are described as "not wholly satisfactory." It seems that a traveling school clinic service which makes possible the examination of over 8000 children in about two hundred and seventy cities, towns and villages of Massachusetts each year should deserve serious consideration. At the end of 1940 the clinics mentioned had examined over 130,000 retarded and problem children in the public schools. The author gives as one of the reasons for the popularity of the Massachusetts school clinics that the recommendations advise the school authorities how "to get rid of the child."

Chapter 13, on psychiatric service for the feeble-minded, is particularly weak and shows a lack of understanding of the subject. The author gives the impression that he is exasperated because the condition of mental deficiency cannot be explained by the Freudian philosophy.

There is a grave question in the minds of many whether or not the heavily staffed, cumbersome and expensive child-guidance clinic is a practical solution to present needs for psychiatric services for children. With thousands of children needing assistance, the existing child-guidance clinics serve hundreds. In essence this book is a plea for the continuation of the old order.

Principles of Hematology. By Russell L. Haden, M.D. Second edition, thoroughly revised. 8°, cloth, 362 pp., with 167 illustrations, 1 colored plate and 30 tables. Philadelphia: Lea and Febiger, 1940. \$4.50.

The second edition of Haden's book has necessitated reprinting and revision within little more than a year. It is essentially a book for the general practitioner. Its chief features are its simple presentation, the large number of mechanistic diagrams of blood formation and blood destruction, and the illustrative cases. There are many excellent photomicrographs.

The text is unfortunately rather scanty, and there is frequent evidence of careless writing. In the interest of simplicity, thoroughness is frequently sacrificed, and occasionally a dogmatic attitude crops up. The volume in dex is still emphasized, although it is being more and more replaced by the corpuscular volume. There is no discussion of bone-marrow findings in various conditions, although it is certain that the intelligent practitioner would like to know about them. The anemias are discussed from illustrative cases only. The photoelectric-cell technic for the estimation of hemoglobin is not mentioned.

Despite these failings, a careful reading of the book by the practitioner should certainly advance his understanding of the field of hematology. The reviewer believes, however, that even the general practitioner should have the benefit of thoroughness in any subject he chooses to inquire into. This must be looked for in other books.

Haemorrhoids and Their Treatment: The varicose syndrome of the rectum. By Kasper Blond, M.D. Translated by E. Stanley Lee, M.S., F.R.C.S. 8°, cloth, 140 pp., with 49 illustrations. Baltimore: Williams and Wilkins Company, 1940. \$4.50.

The author of this work has had an extensive experience with rectal and anal disease in Vienna and in clinics in other cities. His methods of treatment and his results are worthy of close study. He is an exponent of treating hemorrhoids, prolapse, fissure, pruritus and anal fistula by the injection method. The author believes all these conditions are due to one etiologic factor, — venous congestion and its complications, — an assumption that seems to be an oversimplification.

The operative treatment of anal fistula is deprecated because of the many failures; however, such poor results, in the opinion of the reviewer, are due not to the operation but to inadequate or improper postoperative care of the patient.

The methods and technics of the author are excellent, but few will agree wholly with his theories of the causation of anorectal disease.

The New England Journal of Medicine

Copyright, 1941, by the Massachusetts Medical Society

VOLUME 224

MAY 8, 1941

NUMBER 19

PRECANCEROUS DERMATOSES*

OLIVER S. ORMSBY, M.D.†
CHICAGO

PRECANCEROUS dermatoses as discussed in this paper include a group of lesions that are not malignant but in or on which cancer may develop.

The most important precancerous conditions are the keratoses. This group includes senile, arsenical, tar, paraffin and roentgen-ray keratoses and leukoplakia. The precancerous dermatosis of Bowen is probably a distinct type of epithelioma, although much confusion exists as to its limitations. Erythroplasia of Queyrat is a classic precancerous disease.

Carcinoma is a prominent feature in xeroderma pigmentosum, and malignant growths frequently develop in or from pigmented moles. In sailors, farmers, mountaineers and other persons much exposed to the sun's rays and all weather conditions, a presenile dystrophy characterized by atrophy, pigmentation, telangiectasis and keratosis occurs and not infrequently terminates in multiple epithelioma. Whether or not Paget's disease is cancerous in the stage of dermatitis is still a debated question, but there is no doubt that it should be so viewed and treated. The association of kraurosis vulvae and carcinoma is well known, and malignant transformation is of great importance in this disease.

Epitheliomas develop occasionally in keratosis follicularis (Darier's disease), lupus vulgaris, lupus erythematosus, psoriasis and scleroderma, in old scars, particularly those following burns, on cutaneous horns and callosities and in wens, dermoid cysts, ulcers and fistulas.

Montgomery¹ would limit the term "precancerous dermatosis" to Bowen's precancerous dermatosis, senile keratosis, arsenical keratosis, tar and radiation keratosis, leukoplakia and the erythroplasia of Queyrat. He states that in 20 per cent

or more of these cases epitheliomas of squamous type develop.

HYPERKERATOSES

Senile Keratosis

The most significant form of keratosis terminating in cancer and the one to which the term "precancerous" is appropriate is the senile keratoma of Besnier. In a paper presented at the International Congress of 1896 in London, Dubreuilh² gave a clear description of circumscribed keratosis and adopted Besnier's title, which Eller and Ryan³ consider a misnomer — they prefer the term "senile keratosis."

These lesions are seen in people past middle life, oftener in men than in women, and occur on surfaces exposed to the sun and changing weather conditions. The common regions affected are the forehead, the temple, the upper part of the cheeks, the nose, the dorsal surfaces of the hands, the sides of the neck and the ears. The growths are occasionally seen elsewhere. They are pinhead to dime-sized, moderately elevated, sometimes slightly greasy but more frequently dry and hard, firmly adherent, yellowish-brown or black crusts; when forcibly removed, they present on the undersurface numerous horny spines, which have projected into the dilated mouths of the underlying follicles. The skin beneath is uneven, moist and red, bleeds readily and is sometimes superficially ulcerated. The lesions commonly present no inflammatory symptoms, but while they are changing into true epitheliomas some inflammatory reaction may be noted. The course is variable. The process may remain for years without change. Some growths are gradually transformed into epitheliomatous ulcers that gradually enlarge, whereas others become more elevated and wartlike and present the clinical characteristics of a papillomatous epithelioma.

These lesions are often found in association with other changes characteristic of the senile skin, such as atrophy, hyperpigmentations and unusual

*Presented at the New England Postgraduate Assembly, Cambridge, Massachusetts, November 14, 1940.

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dryness, with or without scaling and with more or less persistent seborrheic patches.

The histopathology of senile keratosis was studied early by Hartzell⁴ and Fordyce⁵ and later re-studied, together with verruca senilis (verruca seborrheica), by Freudenthal,⁶ Eller and Ryan,³ Hookey⁷ and Montgomery and Dörffel.⁸ This condition presents a marked hyperkeratosis, which consists of closely packed horny lamellae, and an irregular acanthosis, the basal layer being poorly defined and its cells containing a variable amount of pigment. There are a variable number of mitoses in the epidermal cells, and dyskeratotic phenomena are seen. In the upper cutis there occurs an inflammatory reaction of varying degree of intensity, indicated by vascular dilatation, and a cellular infiltration consisting chiefly of lymphocytes, together with a few plasma and connective-tissue cells. Some basophilic degeneration of the cutis also occurs.

The senile flat wart, verruca seborrheica, often closely resembles the senile keratoma. The lesions of verruca seborrheica occur usually at or past middle life and are found chiefly on the back, over the shoulders, on the chest, on the abdomen at the waistline and occasionally on the face and neck. They are flat, moderately elevated, oval or round, pea to small-coin sized, gray, yellow, brown or black, and present a soft granular surface. The friable greasy crust is easily removed, revealing a red granular or slightly papillomatous base. The lesions may be accompanied by itching, which at times may be severe. Unlike the senile keratoses, they rarely undergo malignant transformation. Occasionally, the surface is smooth, when the process resembles a nonhairy pigmented mole; this type has been designated "nevoid keratosis."

In addition to the typical verruca seborrheica described above, there occurs a hyperkeratotic seborrheic keratosis in the form of scaling pigmented patches that closely resemble senile keratoses. In these the scales are waxy and the skin is thickened, sometimes slightly verrucous; their color is yellow brown to brownish black, and they are found on the face, scalp and upper portion of the trunk in elderly people. These not infrequently undergo malignant transformation.

The characteristic changes consist in hyperkeratosis, acanthosis, horny cysts and hyperpigmentation. The epithelial hyperplasia occurs in the form of a loose or solid network of epithelial cells. Islands of connective tissue are enclosed in this network, owing to the irregular acanthotic prolongation of the rete. Numerous horny cysts are present and are characteristic of the affection. Hyperpigmentation occurs, the melanin granules

being scattered throughout the epidermis as well as being present in the basal layer of epithelial cells; they are also found in the cutis. No dyskeratotic changes are found in the epithelial cells. The cutis may show a moderate inflammatory reaction.

Hookey⁷ summarizes the changes as follows: senile keratoses are characterized by hyperkeratosis and irregular acanthosis, with dyskeratotic phenomena and secondary inflammatory reaction; seborrheic keratoses are distinguished by hyperkeratosis and irregular acanthosis with the formation of an epithelial network, absence of dyskeratosis, a mild inflammatory reaction and, usually, increased pigmentation. The chief points of distinction clinically between the two conditions are their location and appearance. Senile keratoses occur mainly on the forehead, the upper portions of the sides of the face, the ears, the sides of the neck and the dorsums of the hands. The lesions are hard, firmly adherent crusts, with horny spines on the undersurface, which fit into the open mouths of follicles beneath. The surface beneath the crust is moist and red, bleeds easily and is sometimes superficially ulcerated. The seborrheic keratoses are found on the trunk, front and back, the abdomen and, less often, the face and neck. These lesions are soft and granular and easily removed, revealing a soft granular or slightly papillomatous base. The senile keratoses often undergo malignant transformation and are therefore precancerous, whereas the seborrheic keratoses rarely undergo this change and are not considered precancerous.

The lesions of keratosis senilis may be removed by softening with a keratolytic (salicylic acid) ointment for a few days, then curetting the surface and refrigerating with carbon dioxide snow, or trichloroacetic acid may be employed. Diathermy and electrocoagulation are also used. If malignant change is already present, one or the other of the last two methods or surgical excision is preferable.

As a rule, the removal of seborrheic keratoses or warts is necessary only for cosmetic purposes. When they are numerous and large and limited to the trunk, complete removal is not necessary. They may be reduced in size and made less conspicuous by the use of an ointment containing 3 per cent salicylic acid and 5 per cent sulfur. If complete removal is desired, they may be curetted and frozen with carbon dioxide snow, or trichloroacetic acid may be applied. Roentgen-ray therapy is also efficacious.

Keratoses occur quite commonly on the lips, especially the lower. They are often small or oval lesions, moderately elevated. At times they are

linear and may cover half the surface of the lip in the form of a narrow band. They usually occur in men around middle life and older, although they are not infrequently seen at an earlier age. They are persistent and often undergo malignant ulceration. They should always be viewed as having dangerous potentialities, and they should be thoroughly removed as early as possible.

LEUKOPLAKIA

Leukoplakia, as seen in the mouth, occurs as whitened areas of varying size and diverse outline. There may be one or several patches on the surface of the tongue, beneath the tongue, on the buccal mucosa, particularly behind the commissures and over the area opposite the molars, on the gums, on the lips and on the hard palate. At times the lesions occur profusely over a large portion of the buccal cavity. The patches are white or grayish white, thickened in varying degrees, often rough. Erosions occur in patches when the superficial covering is shed. At times the patch becomes verrucous, fissured and vegetating. It is not known in what proportion cancer develops. The process occurs in both syphilitic and nonsyphilitic persons. The chief lesion from which it is to be distinguished is lichen planus, in which the white areas are linear and striate on the buccal mucosa and consist of white papules on the tongue. The presence of cutaneous lesions of lichen planus is a valuable diagnostic point. Occasionally a syphilitic interstitial glossitis with atrophy is associated with leukoplakia. The use of tobacco, both by smoking and chewing, is often an etiologic factor.

In treatment, cessation of the use of local irritants is primarily indicated, the first one being tobacco. Hot and cold food, condiments and vinegar are to be avoided. Electrodesiccation, the electric cautery and radium are the most efficient methods of direct removal. In extensive quiescent cases, palliative treatment is recommended. Partial removal is likely to induce malignant change.

Kraurosis vulvae usually occurs in women of advanced age or at the menopause, or in younger women in whom the condition has been produced by surgical removal of the uterus or ovaries. It is essentially a sclerosing atrophy of the mucocutaneous structures of the vulva. In advanced cases it is characterized by the complete, or almost complete, disappearance of the labia minora, the frenulum and the clitoris, with flattening and reduction in the volume of the labia majora; rigidity of all the vulvar tissues and atresia of the vaginal orifice are also noticeable. The retracted tissues may be whitish, yellowish, reddish or bluish. A characteristic glistening or varnished appearance

may be present. The lesion is usually preceded by intense itching, which may persist, although in some late cases there is a loss of cutaneous sensibility. Taussig⁹ states that 75 per cent occur at the menopause, and that the remainder have some disturbance of ovarian function. True leukoplakia may occur as a complication; if so, cancer often follows.

This condition is to be distinguished from simple leukoplakia of this region, which is similar to that seen in the mouth, and from pruritus with lichenification (neurodermatitis), which produces a whitish thickening of the vulva. When the last condition is present, the usual picture of neurodermatitis is apt to extend over the pubes and down over the inner aspects of the thighs.

The treatment of kraurosis, with or without leukoplakia, is surgical. Taussig⁹ believes that the incidence of cancer can be reduced 50 per cent by complete vulvectomy for leukoplakic vulvitis.

Montgomery and associates¹⁰ give the following characteristic histologic features of leukoplakia: hyperkeratosis; hypertrophy of the stratum granulosum; atrophy of the rete mucosum; liquefaction necrosis of the basal-cell layer; edema and homogenization of the connective-tissue fibers; cellular infiltration, largely lymphocytic, of the mid-cutis; and subsequent atrophy of the cutis and subcutis.

PRECANCEROUS DERMATOSIS OF BOWEN

In 1912 Bowen¹¹ recorded two cases of chronic atypical epithelial proliferation with unique clinical characteristics. Since that time, numerous cases have been recorded, a number of which have differed materially from the original cases reported. As the term denotes, Bowen believed that malignant transformation was probable, and in a number of cases since recorded such transformation has occurred.

In Bowen's cases there were lesions in well-defined patches. The early lesion was a firm pale-red papule covered with a thickened horny layer or a cornified crust. Beneath the crust the surface was papillomatous. Enlargement of the papule formed lenticular or rounded nodular lesions that were discrete or grouped and confluent. The lesions at the margins of the patch had an annular or serpiginous outline. The patches increased in size by the formation of new lesions at the periphery. The clinical appearance suggested a late nodular syphiloderm.

The chief histopathologic changes occur in the epidermis. There is a marked proliferation of the rete, with distortion of its cells. There is amitotic cell division, with clumping of the nuclei, and individual cell keratinization, with the forma-

tion of giant epithelial cells. Vacuolization of the cells occurs, simulating the cell of Paget's disease. The intercellular bridges are preserved, and the basal layer is intact. In the upper corium there is a vascular dilation with a cellular infiltration consisting of lymphocytic and plasma cells.

The process is to be distinguished from extramammary Paget's disease and superficial epitheliomatosis. The localization of the lesions described by Bowen, with their papular and nodular character and serpiginous configuration, makes the clinical distinction from the superficial red scaling or crusted patches seen in Paget's disease.

In all cases, surgical renoval is recommended.

PIGMENTED MOLES

The most dangerous type of mole is flat and slaty or blue black. These moles are commonly seen near the eyes and on the feet. They sometimes undergo malignant transformation without apparent injury. As a rule, however, chronic irritation, trauma, application of caustics or incomplete surgical removal is the immediate cause of malignant change. The moles that are large, brown, flat or elevated, and hairy or free from hair are not usually a menace unless irritated. I have seen quite a large number of generalized fatal cases of malignant melanoma that have followed incomplete surgical removal or cauterization (usually with an acid) of a pigmented mole. As a rule the malignant metastatic tumors are classed as nevocarcinoma or malignant melanoma. Nomland¹² described multiple basal-cell, pigmented epitheliomas developing on basal-cell pigmented nevi.

ERYTHROPLASIA OF QUEYRAT

This is a rare lesion, originally described by Fournier and Darier¹³ as a precancerous condition. It occurs on the glans, the prepuce and the vulva, as well as on the buccal mucosa, including the tongue, cheeks and lips. The lesions are well-defined areas with brilliant-red velvety surfaces. The condition progresses slowly and indefinitely, and it is resistant to local treatment. The cause is unknown, although the process is often associated with syphilis. Conditions from which it must be distinguished are superficial epithelioma, tuberculosis and syphilis.

The characteristic histologic change consists in marked acanthosis, with some cellular infiltration in the upper cutis. Occasionally, dyskeratotic changes, such as those seen in Bowen's disease, occur. Carcinoma always follows, unless the growth is totally destroyed in its early stages.

KERATOSIS FOLLICULARIS

Keratosis follicularis (Darier's disease) is a classic keratotic disease, first described by Morrow¹⁴ and shortly thereafter independently studied by Darier,¹⁵ of France, and White,¹⁶ of America. It was early studied intensively on account of peculiar round bodies, found on microscopic examination, which were believed to be parasites (psorosperms). In his histologic examination of White's original case, Bowen¹⁷ described these bodies as epithelial cells that had undergone anomalous cornification. The disease occurs at all ages, not infrequently beginning in infancy, and is also seen in elderly people. Males are attacked more frequently than females, and heredity is a factor in its production. Trimble,¹⁸ for example, recorded 5 cases in three generations.

The disease is characterized by an eruption beginning as papules, which soon become crust covered and by coalescence produce papillomatous vegetating and tumorlike growths. The eruption is usually most extensive on the trunk, especially in the axillary and inguinal regions and around the neck. It also occurs on the head and extremities. The vegetating and papillomatous lesions are found chiefly in the axillary and genital regions and behind the ears. Seborrhic crusting occurs in the scalp. The early lesion is essentially a follicular keratosis.

The essential pathologic process is a hyperkeratosis of the follicles, which are filled with horny material. The round bodies are found between the prickle cells of the rete malpighii. The disease is uncommon, although numerous examples have been seen all over the world. Wende¹⁹ recorded the first example of malignant transformation seen in this affection.

Treatment is unsatisfactory. Amelioration of the symptoms may be effected with the use of keratolytic ointments and roentgen-ray therapy. The prognosis as to recovery from the disorder is unfavorable, but as to a serious termination it is good, aside from the possibility of malignant transformation.

PAGET'S DISEASE

This disease, as seen on the nipple, was first described by Paget²⁰ in 1874. Extramammary cases were reported many years later (Hartzell²¹).

The nipple cases usually occur on the breasts of women, although some have occurred in men. On the nipple the process is characterized by redness and scaling, which later becomes more marked; the redness deepens, and the surface becomes granulating and exudes a clear viscid secretion forming

crusts, accompanied by sensations of heat, burning and itching of varying intensity. The inflammatory area is well defined, and as time progresses the process extends deeply, forming a circumscribed infiltration of the skin that on palpation suggests a large sized coin or button in the substance of the areola and surrounding parts. The nipple becomes flattened or retracted. Sooner or later carcinomatous infiltration occurs in the substance of the breast. The course of the disease is usually slow, and no attempt at healing of the eczematous process on the nipple occurs.

Extramammary cases have been seen on the penis, scrotum, buttocks, vulva and perineum and in the axilla and numerous other situations. The clinical symptoms are those seen on the nipple. It is likely that the major portion of the lesions on the trunk are examples of superficial epitheliomatosis, which is usually of the basal-cell type.

The characteristic histologic changes consist in edema and hypertrophy of the epidermis, in which peculiar cells are found, together with an inflammatory cellular infiltration in the corium. There is marked hypertrophy of the rete with downward growth of its pegs into the corium. Peculiar double-contoured cells of large size are found in varying numbers. These cells are vacuolated, round or irregular, and often contain two or three nuclei that show varying changes in form, size and location. The Paget cells resemble the dyskeratotic cells found in Bowen's disease, but they have no intercellular bridges. They were formerly considered by Drier to be coccidia or psorosperms, but it is now known that they are cellular degenerations.

A cellular infiltration, consisting of leukocytes, small connective tissue, plasma and a few mast cells, is found in the corium, together with dilatation of the blood vessels, and in the areas of infiltration the collagen and elastin are more or less destroyed. The retraction of the nipple is due to sclerosis occurring around the mammary ducts, the latter being involved in malignant infiltration early in the process in some cases. The subsequent carcinoma may develop either from these ducts or glands beneath or from the surface epithelium.

The histology of the extramammary cases corresponds to the above in most particulars. In some cases the cellular exudate is less pronounced. The presence of the Paget cell and other characteristics identify the condition histologically. Montgomery²² believes that most of the cases reported as extramammary Paget's disease, particularly those on the scrotum, perineum and penis, were histologically frank squamous cell epitheliomas showing individual cell keratinization, whereas those on other

parts of the body histologically were basal-cell epitheliomas, the lesions of Bowen's disease or metastatic carcinomas.

Paget's disease of the breast is distinguished from eczema by its intractable character, its localization to the nipple area, its deeper infiltration—shown clinically by a feeling of hardness revealed by palpation—and, finally, its accompanying malignant growth in the substance of the breast. The reported extramammary cases on the trunk are practically indistinguishable from superficial epitheliomatosis in its crusted type.

Paget's disease of the breast requires surgical extirpation. Complete removal of the breast and accompanying lymph nodes is recommended. The extramammary type may be excised or treated with radium or roentgen rays.

XERODERMA PIGMENTOSUM

Xeroderma pigmentosum is a rare disease that begins in childhood and is characterized by hyperpigmentation, atrophic areas, telangiectases and warty and malignant growths. This disease was first described by Hebra and Kaposi²³ in 1870.

The eruption occurs largely on exposed surfaces, including the face, neck, upper chest, hands and forearms. Other areas are occasionally invaded. Sunburn has initiated the process in several cases. It is distinctly a family disease, being present in two or more members as a rule. The earliest symptom may be an erythema or dermatitis. Following this, or independent of it, frecklelike lesions develop. These become numerous, are of variable sizes and present different shades of yellow and brown. Interspersed between these lesions, variously sized whitish atrophic areas or cicatriform patches develop. Telangiectases and small angiomas are common. Flat or convex warty growths also develop, and these resemble senile keratoses. They are pea sized or larger and are scattered among the pigmented and telangiectatic lesions. At a later date malignant growths appear, and various forms occur, the chief of which is carcinoma. Ectropion is common, with its associated photophobia and lacrimation, and often causes ulceration on the face. Keratitis is common, and nodules and opacities occur in the cornea, causing obstruction of vision.

The progress of the disease is usually slow, though death from marasmus may occur within a few months. Malignant transformation usually occurs after many years and results in a fatal termination. A striking characteristic of the disease is its resemblance to the changes seen in the senile skin. Aside from the fact that it is a family affection and apparently is the result of the action

of the sun's rays on a peculiarly sensitive skin, nothing is known of its cause.

All the changes seen microscopically are closely simulated in sailors' skin and in chronic roentgen-ray dermatitis. The malignant growths oftenest seen are basal-cell epitheliomas. In addition, melanoepitheliomas, trichoepitheliomas, round-cell, spindle-cell and giant-cell sarcomas, endotheliomas, peritheliomas and angiosarcomas have been described, as well as fibromas and angiomas. A detailed histologic description of the disease and its sequelae is impossible.

Xeroderma pigmentosum presents such striking symptoms that it is readily recognized. The early date of onset and the limitation of symptoms to exposed surfaces, together with the combination of pigmented lesions, telangiectases, atrophic spots and areas, associated with the peculiar photophobia and lacrimation, are seen only in this affection.

Treatment is unsatisfactory. Life may be prolonged, however, by preventing exposure to the rays of the sun. General hygienic care is important. The malignant growths respond well to treatment with radium and roentgen rays. Surgery is often indicated.

In most cases the outlook is grave; however, with careful treatment life may be prolonged several years.

OTHER PRECANCEROUS DERMATOSES

Arsenical keratoses develop in people who have used the drug over long periods for the relief of cutaneous dermatoses, such as psoriasis and dermatitis herpetiformis. They are usually associated with pigmentation. Multiple epitheliomas not infrequently develop on these keratoses. I have observed one case in which more than a dozen epitheliomas, both superficial and deep, developed among hundreds of keratoses and hyperpigmented lesions. The malignant transformation occurred chiefly on the hands, limbs and scrotum.

Keratoses occurring in tar and paraffin workers are often associated with acneform lesions and areas of dermatitis, together with scars, the previous site of epitheliomatous ulceration that healed

spontaneously. Cancer from tar is an industrial disease that has been reported in England.

Chimney-sweep (soot) cancer, usually occurring on the scrotum, is only of historic and scientific interest here, since it has been seen chiefly in England and is reported rarely at present.

Roentgen-ray keratoses occur in chronic radio-dermatitis and, unfortunately, are seen quite often. They occur in the skin of unprotected operators most frequently, but occasionally in others. They are usually associated with areas of atrophy and telangiectasia, and not infrequently undergo malignant transformation. Electrodesiccation, electrothermy or excision is recommended for their removal.

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REFERENCES

1. Montgomery, H. Precancerous dermatosis and epithelioma in situ. *Arch. Dermat. & Syph.* 39:387-408, 1939.
2. Dubreuilh, W. Des hyperkératoses circonscrites. *Ann. de dermat. et de syph.* 35 7:1158-1204, 1896.
3. Eller, J. J. and Ryan, V. J. Senile keratoses and seborrheic keratoses. *Arch. Dermat. & Syph.* 22:1043-1060, 1930.
4. Hartzell, M. B. Some precancerous affections of the skin, more particularly precancerous keratoses. *J. Cutan. Dis.* 21:393-403, 1903.
5. Fordyce, J. A. Epithelioma of skin, benign and malignant. *Transactions of the XVth International Congress of Medicine, London, 1913.* Section XIII, Part 1. Pp. 1-14.
6. Freudenthal, W. Verruca senilis und Keratoma senile. *Arch. f. Dermat. u. Syph.* 152:505-528, 1926.
7. Hookey, J. A. Keratoma senilis and verruca senilis: a clinical and histopathologic study. *Arch. Dermat. & Syph.* 23:946-959, 1931.
8. Montgomery, H. and Dörfel, J. Verruca senilis und Keratoma senile. *Arch. f. Dermat. u. Syph.* 166:286-296, 1932.
9. Taussig, F. J. Leukoplakia and cancer of the vulva. *Arch. Dermat. & Syph.* 21:431-445, 1930.
10. Montgomery, H., Counsellor, V. S. and Craig, W. McK. Kraurosis, leukoplakia and pruritus vulvae. *Arch. Dermat. & Syph.* 30:80-100, 1934.
11. Bowen, J. T. Precancerous dermatoses: a study of two types of chronic atypical epithelial proliferation. *J. Cutan. Dis.* 30:241-255, 1912.
12. Nomland, R. Multiple basal cell epitheliomas originating from congenital pigmented basal cell nevi. *Arch. Dermat. & Syph.* 25:1007-1008, 1932.
13. Fournier, A. and Darier, J. Épithéliome bénin syphiloïde de la verge (épithéliome papillaire). *Bull. Soc. franç. de dermat. et syph.* 4:324-328, 1893.
14. Morrow, E. Eine verbesserte Methode der Behandlung gewisser Hautkrankheiten. *Arch. f. Dermat. u. Syph.* 18:261, 1886.
15. Darier, J. De la psorospermosse folliculaire végétante. *Ann. de dermat. et de syph.* 28 10:597-612, 1889.
16. White, J. C. A case of keratosis (ichthyosis) follicularis. *J. Cutan. Dis.* 7:201-209, 1889. Keratosis follicularis (psorospermosse folliculaire végétante). *Ibid.* 8:13-20, 1890.
17. Bowen, J. T. cited by White.²⁰
18. Trimble, W. B. Observations on keratosis follicularis. *J. A. M. A.* 59:604-607, 1912.
19. Wende, G. W. Keratosis follicularis resulting in multiple epitheliomas: report of a case. *J. Cutan. Dis.* 26:531-551, 1908.
20. Paget, J. On disease of the mammary areola preceding cancer of the mammary gland. *St. Bartholomew's Hosp. Rep.* 10:87-89, 1874.
21. Hartzell, M. B. Extramammary Paget's disease, with report of a case occurring on the forearm, associated with a naevo-carcinoma. *J. Cutan. Dis.* 28:379-383, 1910.
22. Montgomery, H. Superficial epitheliomatosis. *Arch. Dermat. & Syph.* 20:339-357, 1929.
23. Hebra, F. and Kaposi, M. *Lehrbuch der Hautkrankheiten.* Vol. II. 735 pp. Stuttgart: Ferdinand Enke, 1876. P. 182.

ACUTE TYPHOIDAL CHOLECYSTITIS AND CHOLELITHIASIS OCCURRING FORTY-THREE YEARS AFTER TYPHOID FEVER*

Report of a Case

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ACUTE suppurative cholecystitis has been recognized as a complication of typhoid fever since the report of a case by Gilbert and Girode¹ in 1890. In 1898, Cushing² pointed out that *Eberthella typhosa* may be responsible for the formation of gallstones. It is also well understood that persons may harbor *E. typhosa* in their biliary or intestinal tracts for many years and thus act as carriers of typhoid fever. Nevertheless, the occurrence of acute suppurative cholecystitis due to *E. typhosa* over forty years after the original attack of typhoid fever is sufficiently unusual to merit recording, and such a case is presented.

CASE REPORT

Mrs. F. F., a 64-year-old widow, entered the Medical Service of the Peter Bent Brigham Hospital on August 1, 1940, under the care of Dr. Reginald Fitz, she complained of pain in the right upper quadrant, nausea and vomiting of 2 days' duration. In 1897, the patient had typhoid fever, and several weeks later an attack of abdominal pain was diagnosed as typhoidal cholecystitis. In 1911, she was ill for 3 weeks with abdominal pain and jaundice. In 1926 and again in 1937, she suffered attacks of pain in the right upper quadrant of the abdomen, indigestion, nausea and vomiting. Intravenous cholecystograms in 1927 showed no definite gall bladder shadow. Cholecystectomy was advised but was refused. There had been no further attacks of abdominal pain until 2 days before entry, when the patient complained of right epigastric pain and indigestion. These symptoms were at first relieved by soda, but the day before entry the pain became severe and radiated to the right shoulder. She became nauseated and vomited repeatedly. The bowels had moved twice since the onset, but their color was not noted. There had been no recent chills or jaundice. The patient had avoided fatty foods for many years, because they gave her indigestion.

Past history showed that the patient underwent subtotal thyroidectomy in 1925 for goiter with hyperthyroidism. She was in the hospital in June, 1940, because of bilateral bronchopneumonia. For 10 years she had had dyspnea on exertion.

There was no family history of typhoid fever, diabetes, tuberculosis, cancer or blood diseases.

Physical examination showed an extremely ill, markedly obese woman. The rectal temperature was 102°F, and the pulse rate was 140. The blood pressure was 145/60. There was marked spasm and tenderness over the entire right side of the abdomen, with maximum tenderness in the right upper quadrant. The tongue was covered by a heavy yellow coat. There were moist rales at both lung bases. The heart was not enlarged, and the sounds were

regular and of good quality. Rectal examination was negative. Generalized arteriosclerosis was evident.

Blood examination showed a red cell count of 4,200,000 with a hemoglobin of 85 per cent (Sahli). The white cell count was 19,500 but gradually decreased to 8500. The blood smear showed 83 per cent polymorphonuclear leukocytes, 14 per cent lymphocytes, and 3 per cent mono-

TABLE 1 Reports on Cultures

MATERIAL	DATE TAKEN	REPORT
Pus from abscess (at operation)	August 16	<i>Eberthella typhosa</i> (pure culture)
Pus from wound	August 23	<i>Staphylococcus aureus</i>
Bile from drainage tube	August 28	<i>E. typhosa</i> (pure culture)
Center of gallstone	August 29	<i>F. typhosa</i> (pure culture)
Urine	August 20	No growth
Urine	August 24	No growth
Urine	August 26	No growth
Duodenal washings	September 13	No growth
Stools (8 specimens)	August 20 to September 10	No enteric pathogens
Stool	September 12	<i>E. typhosa</i>
Stool	September 28	<i>E. typhosa</i>

cytes. The icteric index was 11. Urinalysis was not remarkable except for a slight trace of albumin. The blood Widal reaction was positive in a 1:160 dilution of the serum. The results of cultures are summarized in Table 1.

The diagnoses were acute cholecystitis, generalized arteriosclerosis and obesity.

The patient was treated by bedrest and heat to the abdomen for 15 days before operation was undertaken. During this time, she ran an irregular fever up to 103.6°F by rectum. In general the fever and pulse rate tended to be lower after admission. Nausea and vomiting appeared intermittently. She was given digitalis because of the basal rales and the possibility of heart failure. The right upper-quadrant symptoms persisted, and 1 week after entry a tender mass about 8 by 8 cm. was palpable. The patient was frequently observed by Dr. Reginald Fitz and Dr. John Homans during her hospital stay, and it was their opinion that a perforation of the gall bladder had occurred and that drainage was indicated at that time. However, it was believed that the simplest procedure under local anesthesia should be performed, because the patient was very ill.

Cholecystostomy under local anesthesia was performed by Dr. John Homans on August 15, 1940. A single large gallstone, the size of a ripe olive, was removed. The gall bladder was inflamed and thickened except for one gangrenous area on the anterior medial aspect. Immediately adjacent to that portion of the gall bladder was an abscess walled off by omentum. From the abscess about 30 cc. of thick, greenish-yellow pus was evacuated, from which *E. typhosa* was recovered in pure culture. A catheter was sewed in the gall bladder, and a drain was left in the abscess cavity.

After operation the patient's pulse and temperature

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showed a downward tendency so that by the 16th post-operative day they were within normal limits. Bile drained in amounts of 100 to 400 cc. daily from the cholecystostomy tube until it was removed on the 15th postoperative day. The drain was taken out 5 days after operation. The stools contained bile at all times, but no bile exuded from the wound after the tube was removed. The wound became secondarily infected in the region of the tube and drain, but otherwise healed quickly. The patient was out of bed 21 days after operation and went home 9 days later. She never became jaundiced, and her general condition was markedly improved at the time of discharge from the hospital.

DISCUSSION

Because of their significance the classic observations of Cushing² in relation to typhoidal cholecystitis and cholelithiasis are repeated here. They are as follows:

(1) The bacilli during the course of typhoidal infection quite constantly invade the gall-bladder; (2) the organisms retain their vitality in this habitat for a long period; (3) in the course of time the bacilli are almost invariably found to be clumped in the bile, suggesting the occurrence of an intravesical agglutinative reaction; (4) these clumps presumably represent nuclei for the deposit of biliary salts, as micro-organisms may with regularity be demonstrated in the centres of recently formed stones; (5) gall-stones being present in association with the latent, long-lived, infective agents, an inflammatory reaction in the viscus of varying intensity may be provoked at any subsequent period.

This patient had her initial attack of cholecystitis only a few weeks subsequent to recovery from typhoid fever in 1897. Four attacks of cholecystitis followed at irregular intervals, but it was not until forty-three years after the attack of typhoid fever that she was subjected to operation. The last attack was undoubtedly the severest, and was a true suppurative cholecystitis, with perforation of the gall bladder and formation of an extravascular abscess. The unabated virulence of the infective agent was demonstrated by the patient's stormy clinical course. It is difficult to describe how critically ill this patient was, but it will suffice to say that experienced observers watched her carefully for two weeks before advising even the simplest operative procedure.

The amazing vitality of the *E. typhosa* was only too well demonstrated here. After a forty-three-year interval, the organisms were recovered in pure culture from the bile, from the pus in the extravascular abscess and from the center of the gallstone. I have not found the report of any case in which *E. typhosa* was recovered from the center of gallstones so long after the original attack of typhoid fever. Whipple³ mentions a case in which he recovered *E. typhosa* from the centers of three gallstones in a patient who had had typhoid fever thirty-two years previously.

Since the gall bladder was not removed in this case, no histologic study was possible. However, Mallory and Lawson⁴ found that seven gall bladders from persons who were known to be typhoid carriers for three months to thirty years all showed evidence of chronic cholecystitis. These workers stated that the constant feature in the gall bladders was a diffuse lymphocytic and plasma-cell infiltration of the mucosa. In addition, there were dense focal collections of lymphocytes in typical lymph-node formation, with hyperplastic germinal centers of immature cells. No organisms could be demonstrated in the wall of any of the gall bladders, and there was no cholesterosis.

The patient in this case raised a large family and did all the cooking, yet she caused no known cases of typhoid fever. Undoubtedly she must have been discharging typhoid organisms in her feces for years, if only intermittently. Unfortunately, no stool cultures were made preoperatively. On ten occasions after the cholecystostomy tube was removed, stool cultures were made; only two were positive for *E. typhosa*. These positive cultures were the last of the series, and were taken fourteen and thirty days respectively after the bile ceased draining through the tube.

Because the patient was a poor operative risk, the gall bladder was not removed. Although drainage and removal of the stone have not cured her of being a typhoid carrier, the gall bladder is now free of a porous foreign body that contained *E. typhosa*, and in time the viscus may become sterile. At any rate, in this case it was probably wiser to have a living typhoid carrier than to risk an operative fatality by cholecystectomy.

SUMMARY

A case of acute suppurative typhoidal cholecystitis and cholelithiasis occurring forty-three years after typhoid fever is reported.

Eberthella typhosa was recovered by culture from the bile, from the center of the gallstone and from the pus in the extravascular abscess. The patient was treated by cholecystostomy and removal of the single gallstone, because she was too poor an operative risk to undergo cholecystectomy. The typhoid organisms were still present in the stools forty-five days after operation.

REFERENCES

1. Gilbert, A. and Girode, J. Contribution à l'étude bactériologique des voies biliaires. *Semaine méd.* 10:481, 1890.
2. Cushing, H. W. Typhoidal cholecystitis and cholelithiasis. *Bull. Johns Hopkins Hosp.* 9:91-95, 1898.
3. Whipple, A. O. The surgical treatment of bile typhoid carriers. *Ann. Surg.* 90:631-642, 1929.
4. Mallory, T. B. and Lawson, G. M., Jr. Chronic typhoid cholecystitis. *Am. J. Path.* 7:71-75, 1931.

CLINICAL AND LABORATORY OBSERVATIONS ON HEMOGLOBINURIA OCCURRING DURING SULFANILAMIDE THERAPY*

D. ROURKE GILLIGAN, M.S.,† AND ISRAEL KAPNICK, M.D.‡

BOSTON

ACUTE hemolytic anemia following sulfanilamide therapy is not uncommon^{1,2}. Wood³ has reported an incidence of 24 per cent of acute hemolytic anemia in 378 adults and of 83 per cent in 144 children treated at the Johns Hopkins Hospital. Hemoglobinuria associated with the acute hemolytic anemia has been reported, however, in very few cases. Thus in 21 cases of acute hemolytic anemia following medication with sulfanilamide, Wood³ observed one with hemoglobinuria complicated by gross bleeding from a carcinoma of the bladder, and another in which there was hemoglobin in the plasma but no hemoglobinuria. Kohn⁴ reported a case of hemoglobinuria in a baby, one year of age. Strasser and Singer,⁵ Keefe⁶ and Tavat and Shepard⁶ have each described one case of hemoglobinuria in adults following therapy with this drug.

We have availed ourselves of the opportunity to make clinical observations, hematologic studies and quantitative studies of hemoglobinemia and hemoglobinuria in a case of hemoglobinuria associated with an attack of acute hemolytic anemia during sulfanilamide therapy, which occurred recently in the Beth Israel Hospital. A comparison has been made of the findings in this case with those in some other clinical conditions associated with hemoglobinuria.

CASE REPORT

I R., a 38 year-old Negro chauffeur, entered the hospital on February 5, 1940, with typical signs and symptoms of acute appendicitis. The body temperature was 100°F, the white cell count was 15,500, the spleen and liver were not palpable, the scleras were not icteric, the prostate was enlarged with evidence of prostatitis. X-ray examination of the abdomen by flat plate was negative. There was a history of syphilitic infection 15 years before admission for which some treatment had been received at that time and a history of gonococcal infection 4 years before admission. On two examinations during the present admission the blood Hinton test was positive, the Kahn test doubtful, and the gonococcus complement fixation test positive. Shortly after admission an acutely inflamed appendix was removed under novocain spinal anesthesia. The postoperative course was essentially uneventful until the 4th postoperative day, when the temperature rose to 102°F at noon and remained elevated to 100 or 101.5°F for the

following two days. There were slight redness and induration of the wound. Twenty grains of sulfanilamide and 20 gr. of sodium bicarbonate were administered orally every 4 hours for 2½ days. The dosage of sulfanilamide was then decreased to 60 gr. daily. During these 3½ days of sulfanilamide therapy, the temperature decreased to 99°F (Fig. 1). At the end of this time, that is, on the

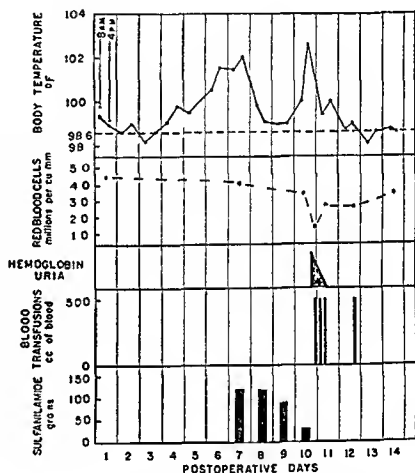


FIGURE 1 Relation of Fever, Acute Anemia and Hemoglobinuria to Sulfanilamide Therapy

10th postoperative day, the temperature again increased to 100°F, and a slightly icteric tint of the scleras was noted. The red cell count, which was 4,500,000 on the day after operation, had gradually decreased to 3,500,000 at this time. The blood hemoglobin had decreased from 88 to 72 per cent. The white-cell count was 24,900. Sulfanilamide was omitted. Eighteen hundred cubic centimeters of 10 per cent glucose in physiologic saline solution was given intravenously. Twelve hours later the red-cell count had dropped to 1,400,000, and the hemoglobin to 28 per cent, the scleras had become more icteric, and the temperature had risen to 103°F. The patient complained of no symptoms and said he felt fine; there were no chills, backache or abdominal cramps. At this same time he voided 500 cc of dark, burgundy red, clear urine containing no red cells or casts. The guaiac and benzidine tests were strongly positive. A quantitative study of the hemoglobin of this urine by the benzidine method revealed 460 mg of hemoglobin per 100 cc.

Three transfusions of 500 cc of citrated blood were given in the following 12 hours, the red-cell count increased

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to 2,800,000, the hemoglobin to 54 per cent, and the temperature fell to 99.5°F. The white-cell count was 25,500. The spleen and liver were not palpable. Hemoglobinuria persisted for a total of 18 hours, during which the urine became progressively less red. One and a half days after sulfanilamide had been omitted, the temperature was normal, the plasma was slightly reddish and contained 25 mg. of hemoglobin per 100 cc., and the plasma bilirubin was 1.54 mg. per 100 cc. Urine voided a few hours after this plasma specimen was taken was normal in color and showed no albumin and no hemoglobin. There was no bile in the urine at any time. The following day the plasma was normal in color and contained a normal amount of hemoglobin, namely, 5 mg. per 100 cc. of plasma; the plasma bilirubin was 1.33 mg. per 100 cc.; the red-cell count was 2,800,000 and the blood hemoglobin 62 per cent. Another transfusion of 500 cc. of blood was given, and ferrous sulfate therapy was started. By the 4th day after the apparent onset of the hemolytic attack, the red-cell count was 3,500,000, the blood hemoglobin 70 per cent, the white-cell count 20,600 and the plasma bilirubin 0.3 mg. per 100 cc. The scleras no longer appeared icteric. Further convalescence was uneventful. The patient was discharged to the Out-Patient Department for follow-up study and treatment of syphilis.

The time between the beginning of sulfanilamide therapy and the development of the acute hemolytic attack in this case—namely, three and a half days—accords with the findings of others, who report these attacks as occurring between the third and seventh days of sulfanilamide therapy.^{2, 5} The therapeutic dosage used was not excessive: Keefer⁵ and Long and Bliss² have pointed out that there is no correlation between the size of the therapeutic dose and the development of an acute attack of anemia. On the other hand, certain subjects appear to be particularly susceptible to the development of these attacks, for the same patient has been shown to suffer a recurrence when a second course of the drug was administered.¹

In the case described, hemoglobinuria occurred during the acute attack of hemolytic anemia. Hemoglobin first appeared in the urine about twelve hours after the temperature began to rise and the icteric tint of the scleras was noted; hemoglobinuria lasted eighteen hours and appeared to cease about simultaneously with cessation of blood destruction. In Kohn's³ case hemoglobinuria lasted for twenty-four hours and in Strasser and Singer's⁴ for three days. In our case the urines containing hemoglobin varied from dark Burgundy-red to pink, in Kohn's³ case the urines were pinkish brown and reddish brown, and in Strasser and Singer's⁴ case the urine was described as *bierbraune*.

No enlargement of the spleen and liver was discernible in the case of this study. In the case described by Strasser and Singer⁴ the spleen became palpable, but the liver was not felt. Spleno-

megaly and hepatomegaly are only occasionally found in cases with the acute attacks of hemolytic anemia following the administration of sulfanilamide.^{1, 2} On the other hand, splenomegaly is not uncommon in the slowly progressive type of anemia encountered more frequently with continued therapy using this drug.⁵

The absence in this case of symptoms such as chills, backache and abdominal pain, characteristic of attacks of intravascular hemolysis seen in the syphilitic type of paroxysmal hemoglobinuria and in attacks of hemoglobinuria following transfusion of incompatible blood, is noteworthy. Similarly, in the case described by Strasser and Singer⁴ there were no symptoms except rather severe fatigue. In our case there was a rise in temperature and a marked leukocytosis; in Strasser and Singer's⁴ there was a rise in temperature during the attack. It is to be noted that fever and leukocytosis during sulfanilamide therapy occur in acute attacks of hemolytic anemia unassociated with hemoglobinuria.^{2, 6} Hemoglobinuria, unassociated with symptoms, and in fact in the absence of development of fever, is observed in attacks of march hemoglobinuria,⁸ is frequently observed in the attacks in Marchiafava-Micheli disease^{9, 10} and has been described in a case of massive hemoglobinuria of obscure etiology studied in this laboratory.¹¹

Although acute hemolytic anemia during therapy with sulfanilamide and related drugs is usually not associated with hemoglobinuria, hemoglobinuria following these drugs apparently never occurs except during an attack of acute anemia. The hemolysis which gives rise to the hemoglobinuria and hemoglobinemia is probably only a small part of the total blood destruction occurring during the hemolytic attack. Comparison of the data in the case of the present study with that collected in other studies of hemoglobinuria made in this laboratory^{7, 8, 11} strongly indicates that the amount of hemolysis represented by the circulating hemoglobin in the case of the present study was far too little to explain the rapid development of anemia. For example, the red-cell count decreased in twelve hours from 3,500,000 to 1,400,000, during which 2.3 gm. of hemoglobin was excreted in the urine, whereas in a case of intravascular hemolysis and hemoglobinuria of obscure etiology studied here,¹¹ the red-cell count decreased only from 4,700,000 to 4,200,000 in three days, during which a total of 16 gm. of hemoglobin was excreted in the urine. Similarly, in the case of the present study the plasma-hemoglobin concentration was only 25 mg. per 100 cc. eighteen hours after hemoglobinuria was first noted and was normal the following day, whereas the plasma-hemoglobin in the

other case remained elevated to levels of 500 to 300 mg for the three days discussed. On the basis of previous findings concerning the rate of fall of plasma hemoglobin after a single intravenous injection of a solution of hemoglobin in normal persons,⁷ it can be roughly estimated that the plasma hemoglobin was not greater than 1000 mg per 100 cc at the time of maximum hemoglobinuria, since it had decreased to 25 mg in eighteen hours. This amount in 3000 cc of plasma would be equivalent to only 30 gm of hemoglobin, or the amount of hemoglobin in 190 cc of normal blood. If the plasma hemoglobin did not suddenly reach such a peak and then decrease as after a single injection of hemoglobin in solution into the blood stream, but remained at an appreciably lower level than this peak for several hours during the hemolytic crisis, the amount of hemolysis still would not be essentially different from the value estimated.¹¹ Obviously many times this amount of hemolysis must have occurred to account for the acute development of the severe anemia. These considerations indicate that the mechanism of the development of the acute anemia following sulfanilamide therapy is probably the same in attacks as associated with hemoglobinuria and in attacks in which this manifestation of hemolysis is not present. As suggested by Long and Bliss,² hemoglobinuria in attacks of acute hemolytic anemia following sulfanilamide may occur only in cases with exceptionally rapid hemolysis. A similar situation exists in congenital hemolytic icterus and acute hemolytic anemia (Lederer type), in which hemoglobinuria sometimes occurs in the fulminant hemolytic crises.^{12*}

Because of the presence of syphilis, a Donath-Landsteiner test was performed on the blood of this patient two days after the beginning of the hemolytic attack, and was found to be negative. The red cells were not hemolyzed by the addition of small amounts of hydrochloric acid to the plasma as in the acid hemolysis test,¹⁰ which is diagnostic of cases of Marchiafava-Micheli disease.¹³ No hemolysis occurred on incubation of the patient's washed red cells suspended in physio-

logic saline solution containing sulfanilamide in concentrations ranging from approximately 10 to 50 mg per 100 cc, or on incubation of the washed red cells suspended in the plasma of a patient of the same blood group who was receiving sulfanilamide therapy and had a plasma concentration of free sulfanilamide of 9.3 mg per 100 cc. Tests made several weeks after the hemolytic attack failed to show hemolysis on incubation of the patient's washed red cells suspended in the plasma to which had been added acetylsulfanilamide to give concentrations ranging from approximately 6 to 30 mg per 100 cc.

The treatment of cases developing acute hemolytic anemia during sulfanilamide therapy consists in immediate withdrawal of the drug, forcing of fluids, and repeated transfusions as indicated during the one to three days of the hemolytic attack. The treatment of these cases associated with hemoglobinuria is the same, except that sodium bicarbonate should be administered in sufficient amounts to keep the urine alkaline so that the kidneys may be protected against damage due to deposition of hemoglobin pigment in the tubules.⁵

SUMMARY

A case of hemoglobinuria occurring during an attack of acute hemolytic anemia following sulfanilamide therapy is reported. The hemolytic process was extremely rapid, the red-cell count decreasing from 3,500,000 to 1,400,000 in twelve hours. Hemoglobinuria appeared during the height of the attack and lasted for eighteen hours. There were fever, leukocytosis and jaundice during the attack but no symptoms, the patient insisting that he "felt fine." The hemolytic attack apparently lasted for about twenty-four hours, during which the patient was treated by blood transfusions. Quantitative data on plasma and urine hemoglobin indicate that the hemoglobin that give rise to the hemoglobinemia and hemoglobinuria represented only a very small amount of the total hemolysis.

The mechanism of the development of the acute anemia during sulfanilamide therapy is probably the same in cases without hemoglobinuria as in cases in which this manifestation of hemolysis is present.

REFERENCES

1. Wood, W. E. Jr. Anemia during sulfanilamide therapy. *J. A. M. A.* 111:1916-1919, 1932.
2. Long, P. H. and Bliss, E. A. *The Clinical and Experimental Use of Sulfanilamide, S. Hystyridine and Allied Compounds*. 319 pp. New York: Macmillan Co., 1939.
3. Kohn, S. E. Acute hemolytic anemia during treatment with sulfanilamide. *J. A. M. A.* 109:1069, 1937.
4. Sraiser, A. and Snger, K. Ueber Promotile Hemoglobinurie und andere Sulfanilamid-Blutgeschädigungen. *Med. Klin.* 34: 83, 1938.

* See this manuscript was submitted we have studied another case of hemoglobinuria following sulfanilamide therapy. This patient, a sixty-year-old man, received sulfanilamide in moderate dosage in the treatment of syphilis. Hemoglobinuria began on the sixth day of sulfanilamide therapy and lasted forty hours. As in the case reported in the text, the attack was asymptomatic but there was a rise in body temperature to 102°F and leukocytosis. Jaundice and anemia developed rapidly during the attack. The patient was markedly increased in weight, increased in size, and increased in size. The patient's plasma hemoglobin concentration during the attack was 480 mg per 100 cc. Spectrophotometric examination showed the presence of methemoglobin in the plasma together with oxyhemoglobin. The urine, which was alkaline throughout the attack, contained only oxyhemoglobin. No methemoglobin in hemoglobin casts or hemosiderin. Recovery from the anemia occurred following four blood transfusions and subsequent iron medication.

5. Keefer, C. S. Sulfanilamide: its mode of action and side effects. *M. Clin. North America* 23:1133-1148, 1939.
6. Tavat, S. and Shepard. Fetal hemoglobinuria due to prontosil. *Türk. tib. cem. mec.* 5:300-305, 1939.
7. Gilligan, D. R., Altschule, M. D. and Katersky, E. M. Studies of hemoglobinemia and hemoglobinuria produced in man by intravenous injection of hemoglobin solutions. *J. Clin. Investigation* 20:177-187, 1941.
8. Gilligan, D. R. and Blumgart, H. L. March hemoglobinuria. Studies of the clinical characteristics, blood metabolism and mechanism with observations in three new cases and review of the literature. *Medicine* (in press).
9. Hamburger, L. P. and Bernstein, A. Chronic hemolytic anemia with paroxysmal nocturnal hemoglobinuria. *Am. J. M. Sc.* 192:301-316, 1936.
10. Ham, T. H. Studies on destruction of red blood cells. I. Chronic hemolytic anemia with paroxysmal nocturnal hemoglobinuria as investigation of the mechanism of hemolysis, with observations on five cases. *Arch. Int. Med.* 64:1271-1305, 1939.
11. Altschule, M. D. and Gilligan, D. R. A case of acute massive hemoglobinuria of obscure etiology with jaundice and anemia, showing exacerbation of hemolysis on walking. Clinical and hematological studies, and measurements of the blood pigment metabolism. *Arch. Int. Med.* (in press).
12. Dameshek, W. and Schwartz, S. O. Acute hemolytic anemia (acquired hemolytic icterus, acute type). *Medicine* 19:331-337, 1940.
13. Ham, T. H. and Castle, W. B. Studies on destruction of red blood cells: relation of increased hypotonic fragility and of erythrocytes to the mechanism of hemolysis in certain anemias. *Proc. Am. Philo. Soc.* 82:411-419, 1940.

MASSACHUSETTS MEDICAL SOCIETY

PROCEEDINGS OF THE COUNCIL

Special Meeting, April 9, 1941

A SPECIAL meeting of the Council of the Massachusetts Medical Society was held in John Ware Hall, Boston Medical Library, 8 Fenway, Boston, on Wednesday, April 9. The meeting was called to order at 10:30 a.m. by the president, Dr. Walter G. Phippen, Essex South; 187 councilors were present (Appendix No. 1).

The Secretary *pro tempore* presented the record of the stated meeting of the Council on February 5, 1941, as published in the *New England Journal of Medicine*, issue of February 27. The President declared the record approved as published.

The Council then proceeded to consider the matters for which the meeting was called, namely, reports from the Committee on Medical Education and Medical Diplomas and the Committee to Consider New Officers and By-Laws, copies of which had been forwarded to all councilors on March 26.

Committee on Medical Education and Medical Diplomas

The report (Appendix No. 2) was presented by the chairman, Dr. John P. Monks, Suffolk. At the suggestion of Dr. Monks, the President ruled that Recommendations 1 and 3 be considered first, since they had little to do with the main body of the report, and then Recommendation 9, which was the kernel of the report.

Recommendation 1 was accepted by the Council, and Recommendation 3 was withdrawn by Dr. Monks.

Recommendation 9 was then discussed, sentence by sentence. In regard to (a), Dr. Reginald Fitz, Suffolk, suggested that the sentence in Section 1 of Chapter V relating to "special meetings of the censors" be deleted. After reading (g), Dr. Monks invited discussion concerning the phrase, "has practiced for a minimum of five years," adding

that this was now interpreted by his committee as meaning "five years after graduation." The question as to how graduates of foreign medical schools should be treated was brought up, but discussion was deferred. After the presentation of (o) and (p), Dr. Charles C. Lund, Suffolk, suggested that having different time limits for the receiving of applications of graduates of approved and unapproved schools seemed unnecessarily complicated, and made a motion to amend the changes so that all applications should be received at the earlier date. The motion was seconded and carried.

In the discussion of Recommendation 9 as a whole, Dr. Michael A. Tighe, Middlesex North, asked for information in regard to the admission of graduates of foreign schools, as previously referred to in the presentation of (g). Dr. Monks replied that his committee had had no difficulty in determining the desirability of a physician who was well known in his native country, but that considerable difficulty had been experienced in passing judgment on recent graduates who had come to the United States either of their own volition or as refugees. He added that accurate information collected by the proposed local boards of membership would greatly assist his committee in making its recommendations. Dr. J. Harper Blaisdell, Middlesex East, moved that (g) be amended by adding after the words, "five years," the phrase, "in this state." The motion was seconded and, after considerable discussion, was lost. It was moved and seconded that Recommendation 9 be adopted, with the amendment in regard to dates; it was so voted.

It was subsequently and separately moved, seconded and voted that Recommendations 2, 4, 5, 6 and 7 be adopted.

Dr Monks then inserted Recommendation 7a, which concerned the elimination of the sentence, "Special meetings [of the censors] may be held by order of the Council," in Section 1 of Chapter V, as previously suggested by Dr. Fitz. Its adoption was moved, seconded and approved.

Dr. Monks, at the suggestion of the treasurer, Dr. Charles S. Butler, Suffolk, amended the first sentence of Recommendation 8 to read:

The fee of three dollars shall be paid to the district secretary by an applicant for fellowship for each examination or re-examination by the censors. This shall be sent promptly to the treasurer of the general society for deposit in the funds of the Society

Recommendation 8, as amended, was adopted, as was Recommendation 10.

The last sentence in Recommendation 11 was changed by Dr. Monks, at the suggestion of Dr. Fitz, to read, "It shall revise the list of medical schools and colleges recognized by the Council annually, for approval by the Council." Recommendation 11, as amended, was adopted.

The changes covering the readmission of former members of the Society—Recommendations 12, 13 and 14—were adopted without discussion.

After commending Dr. Monks's committee, and Dr. Monks in particular, for a very able piece of work, the President asked for a motion to accept the recommendations as a whole. This was made and seconded, and was so voted.

Committee to Study New Officers and By-Laws

The report (Appendix No 3) was presented by the chairman, Dr. John Homans, Suffolk. He stated that the committee had attempted to get in touch with all the district societies to obtain their ideas in regard to the proposed executive committee of the Council. The consensus was that such a committee should be composed of a representative from each district. Dr. Homans then suggested, with the approval of the President, that the Council consider the changes proposed in Chapters III, IV and VI relative to the creation of an executive committee.

The additions to Sections 5 and 7 of Chapter III, having to do with the election of the member of the Executive Committee by the councilors of each district, were then considered. Some discussion arose concerning the word, "immediately," and it was finally voted to amend both sections by substituting "at or as soon as possible" for the word. The additions were adopted, as amended.

Section 10, an addition to Chapter IV, was then discussed. Dr. Homans said that in the second

paragraph the word, "immediately," should be replaced by "at or as soon as possible," as was done in Sections 5 and 7 of Chapter III. The President stated that the last sentence in the first paragraph was unnecessary, and it was voted that the sentence be deleted. Dr. Monks suggested that "1941" in the first sentence of the second paragraph be replaced by "the first year of operation," the change being accepted by Dr. Homans and the President. The new section, as amended, was adopted.

The addition to Section 1 of Chapter VI was adopted, as were the recommendations, as a whole, dealing with the Executive Committee.

Dr. Homans then proceeded with the proposed changes necessitated by the appointment of an executive secretary. He said that the changes in Section 4 of Chapter VI merely define what the secretary of the Society must do and what he may assign to an executive secretary. It was pointed out that the first sentence in the eighth paragraph was a repetition of the second paragraph; the deletion of this sentence was accepted. In the discussion of Section 5 of Chapter VI, it was suggested that, in the first paragraph, "shall" be replaced by "may" in the first sentence, and "until his successor has been duly elected" be replaced by "at the pleasure of the Executive Committee" in the second. (Subsequent to the meeting, the first sentence was shifted and substituted for the fifth paragraph of Section 10 of Chapter IV, where it obviously belonged.) In commenting on the suggested changes, the President called attention to the fact that they merely permitted the Executive Committee to choose an executive secretary if it saw fit or if it were so instructed by the Council. The changes, as amended, were adopted. The President ruled that the proposed change in Section 1 of Chapter V did not require action.

The Council then adopted the recommendations of the committee as a whole.

It was moved, seconded and voted that the thanks of the Council be extended to Dr. Homans and his committee and that the committee be discharged from further duty.

Incidental Business

The President then attempted to carry out certain routine business of the Society. Dr. Braintree F. Conley, Middlesex South, raised the question whether this could be done, since the meeting had been called for a special purpose. The President ruled that such matters could be considered, but asked for opinions from ex-presidents of the Society. Dr. Channing Frothingham, Suffolk, and Dr. Walter P. Bowers, Worcester, concurred.

whereas Dr. Halbert G. Stetson, Franklin, and Dr. Charles E. Mongan, Middlesex South, dissented. Dr. Elmer S. Bagnall, Essex North, moved that the Council endorse the President's interpretation; this motion was seconded and carried.

Three restorations to fellowship (Appendix No. 4) were authorized by the Council, and new committees to consider the restoration of eleven former fellows (Appendix No. 5) were nominated by the President and approved by the Council. With the latter, Dr. Monks suggested that the committees be instructed to report to the Council at the May meeting, owing to the proposed changes in the by-laws; the President instructed the Secretary to notify the committees accordingly.

The appointment of Dr. Edwin D. Gardner, of New Bedford, to replace Dr. Ralph W. French, of Fall River, as a delegate to the annual meeting of the Rhode Island Medical Society was confirmed.

An increase in the Committee on Maternal Welfare from ten to fifteen members was authorized by the Council.

A letter from Mr. William W. McCarthy, of the National Shawmut Bank, relative to means of financing the costs of medical care, was referred to the Committee on Public Relations.

Dr. Fitz, as chairman of the Committee on Medical Preparedness, presented a resolution covering the deferment of medical students and interns (Appendix No. 6). This was adopted by the Council.

Dr. Bagnall presented a motion stating that each district representative on the Committee on Public Relations should be a councilor and also the chairman of the public-relations committee in his district society. The President stated that the Council had no power to pass such a rule, since the selection of local officers rests entirely in the hands of the members of the district society, but that it might be acted on as a sense-of-the-meeting matter. It was so moved and seconded, and the motion was passed.

Dr. William A. R. Chapin, Hampden, asked for information in regard to what should be done by the medical profession to counteract the ruling recently obtained by the federal government in its suit against the American Medical Association and certain subsidiary organizations. Dr. Tighe, by permission of the President, replied that the decision would be appealed and that no action should be taken until the matter was finally settled in the courts.

The meeting was adjourned at 1:32 p.m.

ROBERT N. NYE, *Secretary pro tempore*.

APPENDIX NO. 1

ATTENDANCE

BARNSTABLE

M. E. Champion
D. E. Higgins
W. D. Kinney
O. S. Simpson

G. L. Schadt
G. L. Steele

HAMPSHIRE

J. D. Collins
L. N. Durgin
L. B. Pond

BERKSHIRE

J. J. Boland
I. S. F. Dodd

MIDDLESEX EAST

C. R. Baisley
J. H. Blaisdell
Richard Dutton
E. M. Halligan
J. H. Kerrigan
K. L. MacLachlan
G. R. Murphy
R. R. Stratton

BRISTOL NORTH

W. H. Allen
R. M. Chambers
F. H. Dunbar
W. H. Swift

BRISTOL SOUTH

G. W. Blood
R. B. Butler
E. D. Gardner
F. M. Howes
H. E. Perry
C. C. Tripp

MIDDLESEX NORTH

R. L. Drapeau
F. L. Gage
G. A. Leahey
M. A. Tighe

ESSEX NORTH

E. S. Bagnall
R. V. Baketel
C. S. Benson
E. H. Ganley
H. R. Kurth
R. C. Norris
L. C. Peirce
G. L. Richardson
F. W. Snow
T. N. Stone
C. F. Warren
C. A. Weiss

MIDDLESEX SOUTH

C. F. Atwood
E. W. Barron
Harris Bass
G. F. H. Bowers
R. W. Buck
E. J. Butler
B. F. Conley
P. A. Consales
C. L. Derick
A. W. Dudley
F. W. Gay
H. G. Giddings
H. W. Godfrey
A. M. Jackson
A. A. Levi
A. N. Makechnic
R. A. McCarty
J. C. Merriam
C. E. Mongan
J. P. Nelligan
Dwight O'Hara
L. S. Pilcher
Max Ritvo
E. S. A. Robinson
E. F. Ryan
E. J. Sawyer
E. F. Sevall
H. W. Thayer
J. H. Townsend
Fresenius Van Nüys
W. S. Whittemore
Hovhannes Zovickian

ESSEX SOUTH

N. P. Breed
Loring Grimes
P. P. Johnson
B. B. Mansfield
W. G. Phippen
Horace Poirier
E. D. Reynolds
C. F. Twomey

FRANKLIN

W. J. Pelletier
H. G. Stetson

HAMPDEN

F. H. Allen
W. C. Barnes
W. A. R. Chapin
J. L. Chereskin
E. C. Dubois
G. L. Gabler
P. E. Gear
Frederic Hagler
G. D. Henderson
M. W. Pearson
A. G. Rice

NORFOLK

J. D. Adams
Carl Bearse
M. I. Berman
G. F. Blood

F P Denny
G L Doherty
D G Eldridge
H M Emmons
Susannah Friedman
David Glunts
B T Guild
Morris Ingall
I R Jankelson
C J Kuckham
C J E Kuckham
E L Kuckham
D L Lionberger
D S Luce
D L Lynch
S M Saltz
D D Scannell
J W Spellman
M H Spellman
J P Treanor, Jr
W J Walton

NORFOLK SOUTH

C S Adams
H H A Blyth
H A Robinson

PLYMOUTH

J E Brady
P B Kelly
P H Leavitt
G A Moore
D W Pope

SUFFOLK

A W Allen
W B Breed
W E Browne
C S Butler
G C Caner
E M Chapman
M H Clifford
Lincoln Davis
R L DeNormandie
N W Faxon
G B Fenwick
Reginald Fitz

Channing Frothingham
Joseph Garland
John Homans
A A Hornor
H A Kelly
T H Lanman
C C Lund
H C Marble
G R Minot
J P Monks
Donald Munro
H L Musgrave
R N Nye
F R Ober
J P O'Hare
L E Parkins
L E Phaneuf
Helen S Pittman
G C Shattuck
R M Smith
M C Sosman
Augustus Thorndike Jr
E F Timmins
Conrad Wesselhoef

WORCESTER

Gordon Berry
W P Bowers
L R Bragg
E B Emerson
G E Emery
J M Fallon
E L Hunt
E R Leib
W F Lynch
A W Marsh
C A Sparrow
F H Washburn
R P Watkins

WORCESTER NORTH

E A Adams
H C Arey
J J Curley
T R Donovan
C B Gay
J C Hales
B P Sweeney

of the committee is solely responsible have been inserted after each suggested change in the by laws

For several years among the applicants for fellowship in the Society the number of graduates of medical institutions not on the list recognized by the Council has been increasing. At present there are two groups of such graduates. One, and much the larger group, is composed chiefly of graduates of domestic institutions not recognized as medical schools by the American Medical Association. This group also includes a few American born graduates of foreign medical schools who have studied abroad usually because they were not accepted by any recognized domestic medical school. There are a few foreign born, foreign educated physicians in this group who have migrated to this country, chiefly before 1937. The other group, much smaller than the first, is composed almost entirely of foreign born graduates of foreign medical schools who are chiefly German and Jewish, but by no means exclusively either. Most of these physicians have migrated recently to this country, primarily to escape political oppression. Almost without exception they have had a good medical education and are of proved ability, often being older men of outstanding ability with international reputations.

The members of the Committee on Medical Education and Medical Diplomas are unanimous in believing that it is in the best interests of this Society to treat these two groups differently. The basis of this difference we believe should be whether or not an applicant has had an adequate medical education and enjoys a good professional reputation. With very few exceptions the members of the first group have had an inadequate education, those of the second an adequate one, and it is usually not difficult to distinguish between them. We believe that members of the first group should be admitted to membership only when there is ample positive proof that they can be regarded as truly desirable additions to the Society. At present, in the absence of evidences of undesirability other than an inadequate medical education they are assumed to be desirable. We cannot agree with this attitude. We believe the members of the second group should become members of the Society as soon as they have been long enough in this country to have created definite favorable opinion in the minds of colleagues whose judgment would be commonly considered valuable.

The committee has been unable under the present system to evaluate adequately the desirability for fellowship of the majority of candidates appearing before it. Repeated attempts to gather information about the prospective candidates from the officers and fellows of the district societies have usually failed. A typical situation is for an applicant who is a graduate of an unrecognized domestic school to appear before the members of the committee, who have never seen him before but who must decide as to his desirability from his appearance, diploma, application blank and a sheaf of letters personally solicited from his medical acquaintances who invariably say that the applicant is a capable and conscientious practitioner of medicine and that his practice is ethical. Only rarely has the committee received what it regards as a confidential expression of honest intelligent opinion regarding an applicant and his work from colleagues who really know him. Part of the present functioning of the committee as dictated by the by laws has become farcical in the minds of its members. A major change in this undesirable situation seems impossible under the present by laws.

APPENDIX NO 2

REPORT OF THE COMMITTEE ON MEDICAL EDUCATION
AND MEDICAL DIPLOMAS

The Council at its meeting May 21, 1940, directed the Committee on Medical Education and Medical Diplomas to submit to it changes in the by laws relative to the method of admission of the graduates of unapproved medical schools to the Society. While engaged in this task the committee thought that certain other matters not directly in line with the above purpose, but more or less related to it should be included in the changes to be submitted. Following are the report and recommendations as submitted to the Council at its meeting on February 5, 1941. It was decided at that meeting that the report should be printed in full with appropriate comments, so that the whole matter might be more carefully considered at a special meeting of the Council to be called for that purpose. Explanatory comments for which the chairman

The committee therefore recommends that the following changes be made in the by-laws:

1. The name of the committee be changed to the Committee on Medical Education. (*The Committee on Medical Diplomas was created in 1881 primarily to make a periodic revision of the list of medical schools recognized by the Council. The Committee on Medical Education was created in 1906 primarily to consider improvement of state laws regarding registration in medicine. The two committees were combined in 1913. The present chief function of the Committee on Medical Education and Medical Diplomas is to investigate the qualifications of applicants who are graduates of unrecognized schools. The change is recommended only in the interest of simplification.*)

2. Chapter I, Section 1: In line 5 on page 9 delete the clause, "that their names and addresses . . . prior to their examination by the censors." (*This clause appears more appropriately elsewhere. See Recommendation 9.*)

3. In line 10 on page 9 omit the words, "or college." (*It seems unnecessary now to use the terminology "medical school or college," though it once might have had some legal reason. The change is recommended only in the interest of simplification.*)

4. In line 14 on page 9 after "code of ethics of this Society;" insert "that they have made application according to the provisions of Chapter V, Section 2; that they have paid the examination fee of three dollars." (*The ultimate responsibility of seeing that all new applicants comply with the various provisions for entrance into the Society should rest with the censors. Article 3 of the constitution of the Society reads in part as follows, "No person shall become a member of the Massachusetts Medical Society except upon examination by the censors of said society . . ." The contents of these two clauses are discussed under Recommendations 9 and 8a respectively.*)

5. Chapter I, Section 6: In line 5 on page 10 substitute the word, "December," for "November." (*The date of the present fall censors' examination is the first Thursday in November. According to the new "time-table" set up under Recommendation 9 the first Thursday in December seems better, as otherwise the closing date for applications from graduates of unapproved schools falls too close to Labor Day, an admittedly poor date for district secretaries and applicants alike. No such change in the date of the spring examination is needed.*)

6. Chapter V, Section 1: Beginning at line 11 from bottom of page 16, delete the whole paragraph, "Diplomas from medical schools . . . to take an examination." (*The contents of this paragraph appear more appropriately elsewhere. See Recommendation 9. The only factual change is in the period of time.*)

7. In line 2 from bottom of page 16 substitute the word, "December," for "November." (*See Recommendation 5.*)

8. At the bottom of page 16 insert the following: (a) "A fee of three dollars shall be paid by an applicant for fellowship to the district secretary for deposit in the funds of the general Society before each examination or re-examination by the censors. (b) An applicant shall not be considered as possessing the requisite qualifications for fellowship unless approved by at least three censors. (c) An applicant failing two examinations shall be disqualified from again applying for fellowship until three years have elapsed from the date of the last application."

(a. Examination by the censors of applicants for fellowship at present involves the applicant in no expense. The

censors, however, are paid for their work, as provided for in Chapter V, Section 4, of the by-laws. In accordance with the usual custom of institutions of learning, learned societies and boards of registration in medicine everywhere it is felt that the Society should charge a fee for its examinations.

b. Unchanged.

c. If an applicant is not passed by the censors at two examinations, it is believed that some time should elapse before re-examination, so that an applicant may improve his qualifications and not appear at every examination with essentially unchanged qualifications.)

9. Chapter V, Section 2: To read as follows:

(a) "An applicant for fellowship who is a graduate of a medical school recognized by the Council shall apply on a form furnished for the purpose to the secretary of the district in which he has legal residence, not later than March 1 for the May censors' examination or October 1 for the December censors' examination. (b) At this time the district secretary shall verify the applicant's diploma and shall deliver the application form to the Secretary of the Society not later than March 10 or October 10 respectively. (c) An applicant nonresident in Massachusetts shall apply to the secretary of the Suffolk District Medical Society and shall be examined by the censors thereof. (d) Consideration of a late application shall be postponed until before the next succeeding examination. (e) The names of all such applicants, their addresses, medical schools, dates of graduation and the names and addresses of the various district secretaries shall be published in a list in the first number of the *New England Journal of Medicine* on or after April 1 or November 1. (f) Confidential communications regarding the qualifications of applicants for fellowship shall be requested of the fellows of the Society to be sent to the appropriate district secretary not later than April 15 or November 15.

(g) "An applicant for fellowship who is a graduate of a foreign medical school or a domestic medical school not on the list recognized by the Council or of a medical school no longer in existence, and who has practiced for a minimum of five years, shall apply for fellowship in like manner with the following exceptions and additions:

(h) "The application form must be submitted to the district secretary not later than February 15 or September 15. (i) At this time also the applicant must submit the name and address of a fellow of the Society who has agreed to act as his sponsor. (j) The sponsor's duty is to obtain from fellows of the Society who are acquainted with the applicant and his work, confidential written opinions regarding his qualifications for fellowship to be mailed directly to the district secretary not later than March 15 or October 15. (k) The application form of such an applicant shall be delivered by the district secretary to the Secretary of the Society not later than February 20 or September 20. (l) A list, similar to that of applicants who are graduates of recognized schools, but with the addition of names and addresses of sponsors shall be published in the first number of the *New England Journal of Medicine* on or after March 5 or October 5.

(m) "The president, secretary and supervising censor of the district society, sitting as a local board of membership, shall then gather such further information as is deemed necessary to determine whether an applicant is a capable and conscientious practitioner of medicine and possesses a good professional reputation among his col-

leagues (n) Every candidate must be personally interviewed by this board

(o) The district secretary shall deliver to the chairman of the Committee on Medical Education a complete confidential file of all applications including correspondence, and the written recommendations of the local board with supporting reasons for advocating the acceptance or refusal of each applicant not later than April 1 or November 1

(p) The committee shall then determine whether or not each candidate shall be approved for examination by the censors, and shall notify the district secretary and each applicant of their decision not later than April 20 or November 20

(a) *Provisions unchanged except for dates* The system of definite unchanging dates from year to year is utilized throughout except in the case of examination dates, rather than the present method of dating by giving the number of weeks before the examination. The present method has always caused confusion in the minds of district secretaries and applicants alike since the actual date differs each year. Dates are set so to allow ample time for the district secretaries, the secretary of the Society, the editor of the Journal, the local boards of membership and the Committee on Medical Education to perform their duties properly, as well as to allow no misunderstanding in anyone's mind concerning the date by which certain duties should be finished. Anyone who has not been one of the above mentioned officers has difficulty in appreciating the importance of this point

b *Transporting bulky framed diplomas to be shown to more than one official of the Society, as now occurs is unnecessary* The Secretary of the Society has to certify and edit certain information on the application blanks before publication in the Journal

c *Unchanged*

d *Nothing is more troublesome to all the officials concerned than attempting to handle late applications which now are submitted up to the very eve of the examination and which are always coupled with requests for special consideration*

e *Unchanged except as to dates*

f *Occasionally unfavorable information of importance about an applicant exists. If it is withheld by an applicant's colleagues and an applicant is omitted to the Society responsibility should rest on those who withheld the information. Such information when made available is always treated confidentially*

g *Unchanged in essentials*

h *The difference in dates from those in a is due to the more numerous procedures required in the cases of graduates of unapproved schools*

i and j *Sponsorship of an applicant who is a graduate of an unapproved school is a new proposal. Previously the applicant always personally approached his colleagues and asked for written recommendations. This system produced recommendations some of which were retracted by their writers in separate communications and other recommendations which were obviously written by fellows who were only casually acquainted with the applicant and others which were refuted by other available information. It is hoped that the new system will alleviate the embarrassment of an applicant's personally asking for a recommendation from a fellow who does not feel he can honestly give it*

k *See b*

l *Unchanged, except as to dates*

m *This change is the most fundamental of all those suggested. The Committee on Medical Education and*

Medical Diplomas has sensed for a long time how helpless it was in obtaining adequate information on which to determine the desirability of candidates for fellowship, this point has already been discussed more fully in the formal report. It is believed that a local board will be in every way better fitted to obtain this information than the central committee. The number of men on the board is small, they are already in positions of responsibility in their local society, and two of the three are already members of the board of censors which eventually will examine those candidates finally approved. Further, it is very definitely felt that in the case of graduates of unrecognized schools the essential responsibility of whether or not they should be admitted to membership in the local society should be with their own nearby colleagues, not with those farther afield. See Recommendation 11 e

n *Unchanged except that the interview shall be carried out by the local board rather than the central committee*

o and p *This provides that the central committee shall take the responsibility of seeing that on one hand undue pressure has not been brought to bear on the local board to recommend for approval an undesirable applicant nor on the other hand has unwarranted local prejudice bordered from approval a desirable applicant*

10 *Chapter V, Section 3* In line 4 on page 17 after the words, 'applicants for fellowship,' insert the clause 'they shall see that each applicant pays the examination fee' (See Recommendation 8 a. This is inserted as it becomes a new duty for the district secretary)

11 *Chapter VII Section 5* First two paragraphs to be changed to read as follows

(a) "The Committee on Medical Education shall consist of five fellows. It shall consider all matters relating to medical education which may be referred to it by the Council." (b) It shall review the case of every applicant for fellowship who presents according to the provisions of Chapter V, Section 2, a diploma from a medical school not on the list recognized by the Council. (c) It shall have the power to approve for examination by the censors such an applicant and all decisions of the committee thereon shall be final. (d) It shall revise the list of medical schools recognized by the Council whenever it appears necessary."

(a) *Unchanged*

b *Changed in accordance with 9 a and p*

c *Unchanged*

d *Changed in that previously the committee had to await direction by the Council to accomplish this duty. It is believed that this list should conform to that of the medical schools approved by the American Medical Association which is changed from time to time. The present list dated 1934 needs sixteen changes to bring it into such conformity.*

A recent ruling by the President reversed the previous interpretation of the provisions of the bylaws regarding the application for readmission to the Society of a former fellow whose resignation had been requested by the Committee on Ethics and Discipline. Inasmuch as the individual in question was a graduate of an unrecognized school, it was ruled that he had to appear before the Committee on Medical Education and Medical Diplomas for approval, before being allowed to appear before the censors. Due to information requested from the chairman of the Committee on Ethics and Discipline, the Committee on Medical Education and Medical Diplomas disapproved the application. The latter committee, as a result of this case, believes that it should have no jurisdiction in such cases.

of readmission to the Society, and as a result studied the provisions of the by-laws regarding readmission. With the approval of the Committee on Ethics and Discipline and the Committee on Membership it recommends that the following changes be made in the by-laws:

12. *Chapter 1, Section 7:* To read as follows: "The resignations of fellows whose assessments have been paid in full or remitted may, on recommendation of the Committee on Membership, be accepted by the Council and sent to the treasurer of the Society." (*The sentence dealing with readmission is deleted. The matter is now dealt with in Recommendation 14 a.*)

13. *Chapter 1, Section 8:* Omit last paragraph, "Fellows who have been deprived . . . secretary of the general Society." (*The sentences dealing with restoration to fellowship are deleted. The matter is now dealt with in Recommendations 14 a, b, c, d, and e.*)

14. *Chapter 1:* Add *Section 10*, to read as follows:

(a) "Former fellows who desire to be readmitted to the Society shall make application in writing addressed to the Council and sent to the secretary of the Society. (b) Such applications shall be referred for investigation and personal interview to the local boards of membership, which shall report their recommendations to the Committee on Membership. (c) The committee shall render the final decision as to whether to recommend to the Council the readmission of former fellows. (d) The Council shall have the power to readmit former fellows so recommended. (e) Boards having under consideration the applications of fellows whose resignations have been requested by the Committee on Ethics and Discipline, or who have been deprived of fellowship under the terms of section 8, clause (c), shall consult with the Committee on Ethics and Discipline before reporting their recommendations."

(a and b. *The distinction formerly made in Chapter 1, Sections 7 and 8, between the method used in readmitting to fellowship those fellows who having "resigned" and those who having been "deprived of the privileges of fellowship" desire to rejoin the Society has been eliminated. It is believed that the local boards of membership can more adequately investigate the facts surrounding a fellow's separation from the Society and the altered situation that leads him to seek readmission than can either the censors or a specially appointed committee, as is the practice at the present.*

c. *The Committee on Membership should retain jurisdiction to review the recommendations of the local boards as it does at present in all cases of deprivation of fellowship. At the present it has no jurisdiction in cases of readmission to the Society following resignation.*

d. *The Council should have the full power of readmission of all former fellows recommended by the Committee on Membership. At present it has no jurisdiction in cases of readmission to the Society following resignation.*

e. *At present in cases where the Committee on Ethics and Discipline has requested a fellow's resignation as a form of discipline, and such resignation has been received, and the fellow later reapplies for readmission, the Committee on Ethics and Discipline has no jurisdiction in the matter of readmission. If the fellow in question is a graduate of an unrecognized school he must appear at present before the members of the Committee on Medical Education and Medical Diplomas, who if they approve his application pass him on to the censors for examination. This procedure is most illogical, since those who know nothing about the fellow deal with his readmission, while*

those who know everything about him have no official hand in the matter. At present the Council acting on separate reports of the Committee on Ethics and Discipline and the Committee on Membership may deprive a fellow of the privileges of fellowship as provided in Chapter 1, Section 8 (c). With such a fellow desiring restoration to fellowship, a special committee is appointed to consider his case, and the by-laws provide that this committee must include at least one member of the Committee on Ethics and Discipline. The latter committee believes that with the institution of local boards of membership consultation with the Committee on Ethics and Discipline will provide sufficient opportunity for the board to know all the facts in the case before reporting its recommendations.)

JOHN P. MONKS, Chairman.

APPENDIX NO. 3

REPORT OF THE COMMITTEE TO CONSIDER NEW OFFICERS AND BY-LAWS

Following the Council meeting of October 2, 1940, a committee was appointed by the president of the Massachusetts Medical Society to study the desirability of establishing the offices of president-elect and full-time or executive secretary and to suggest the necessary changes in the by-laws required to create these positions. At the Council meeting of February 5, 1941, the by-laws dealing with the creation of the office of president-elect were accepted. At the same meeting the plan of having an executive secretary was accepted in principle, but the manner of electing the executive secretary was left to be determined.

At the Council meeting of October 2, 1940, a motion was made that this same committee should study the possibility of redistricting the Massachusetts Medical Society, with the idea of harmonizing its set-up with that of the American Medical Association and other state societies. The committee, in reporting at the Council meeting of February 5, 1941, took no action in respect to the problem of redistricting, but did suggest certain by-laws by which an executive committee of the Council could be established. In respect to the latter, the Council voted "that the committee continue and that it explore the possibilities of an executive committee so constituted that each district medical society would be represented."

Hence, your chairman has circularized the secretaries of the different district societies, asking them to secure, if possible, in the brief time between Council meetings, an opinion from their respective districts as to the best method of selecting an executive committee of the Council, and the possibility of redistricting the Massachusetts Medical Society.

In one way or another, your chairman has heard from six secretaries and from various sources has received the following impression: that no district desires a change in its boundaries and that a majority of the districts are opposed to such a change; that the idea of an executive committee of the Council is generally acceptable and that the districts prefer that each of them should be represented on this committee, no others to be made members of the committee except the officers of the Society. In accordance with this understanding, your committee, after consulting together, suggests the following changes in the by-laws.

JOHN HOMANS, Chairman.

CHAPTER III

DISTRICT SOCIETIES

Section 5 (Additional)

The councilors of each district society shall meet immediately after the annual meeting of the district society in 1941 and elect one of their number to serve as a member of the Executive Committee of the Council in accordance with Chapter IV, Section 10. Thereafter, in a similar manner, they shall elect a new member from time to time.

Section 7 (Additional)

The secretary of each district society immediately after the annual meeting of the district society in 1941 shall call together its councilors for the purpose of electing a member of the Executive Committee of the Council and shall send the name of the member chosen to the Secretary of the general Society. He shall see that a new member is chosen in a similar manner to fill a vacancy as it occurs, in accordance with Chapter IV, Section 10.

CHAPTER IV

THE COUNCIL

Section 10 The Executive Committee shall consist of the President, President Elect, Vice President, Secretary and Treasurer *ex officio*, and a councilor from each district medical society chosen in accordance with Chapter III, Section 5. The election of a councilor to the Executive Committee of the Council shall not be considered as leaving a vacancy among the councilors from the district he represents.

The councilors of each district society shall meet immediately after its annual meeting in 1941, as specified in Chapter III, Section 5, and in a similar manner at stated intervals as specified below, to choose one of their number to serve as a member of the Executive Committee of the Council.

A member of the Executive Committee shall serve for three years and shall not be eligible for re-election before the expiration of three years following the conclusion of his term of office, except that in 1941 six members shall be selected by lot to serve one year, six members shall be selected by lot to serve two years and six members shall be selected by lot to serve three years. Thereafter, six members shall be elected every year to succeed in office those whose terms are about to expire.

The Executive Committee shall meet at the call of the President at least once in each interval between Council meetings and may meet more often at the pleasure of the President. It shall assist the President in preparing for the consideration of the Council matters calling for action by the Council at its next meeting. It shall authorize action by the officers of the Society when circumstances require it, subject to the approval of the Council. It shall perform such other duties as the Council may require.

The consent of the Executive Committee shall be required to confirm the appointment, upon nomination by the President, of the Executive Secretary of the Society.

Upon request, members of the Executive Committee shall be paid the amount of their traveling expenses from the funds of the Society.

CHAPTER V

CENSORS AND SUPERVISORS

Section 1 The supervisors, representing the censors of the several district societies, shall constitute a board, which shall meet annually on the day appointed for the annual meeting of the Council. The board shall elect a

chairman, who shall have power to call special meetings. Five supervisors shall constitute a quorum. The Secretary or Executive Secretary of the general Society shall act as secretary of the board. He shall call special meetings at the request of five supervisors. He shall keep a permanent record of the proceedings of the board, and shall provide, at the expense of the Society, papers and forms necessary for conducting examinations of applicants for fellowship. The board at its annual meeting shall adopt a uniform plan for the examination of applicants. The supervisors shall be paid the amount of their traveling expenses from the funds of the Society.

CHAPTER VI

OFFICERS

Section 1 (Additional)

He shall call at least one meeting of the Executive Committee of the Council between Council meetings and may call more meetings if he so desires.

Section 4 The Secretary may assign to an Executive Secretary any or all the duties now to be enumerated, except as specified below.

The Secretary shall attend all meetings of the Society and of the Council, and shall record their respective proceedings in separate record books, and this duty he may not assign.

He shall cause to be engrossed and shall sign the diplomas of new fellows if satisfied that they have met the requirements of Sections 1 and 2 of Chapter I, and shall issue all diplomas and certificates of fellowship. He shall notify individual fellows, in appropriate instances, of votes by the Council granting permission, as the case may be, to retire, to resign, to change district membership, to have dues remitted, or of votes depriving them of the privileges of fellowship, and these duties he may not assign.

He shall act *ex officio* as secretary of all boards of trial and this duty he may not assign.

He shall have custody of the seal of the Society and of all books, papers, manuscripts, prints and paintings belonging to the Society, except such as are in charge of the Treasurer, and this duty he may not assign.

He shall act *ex officio* as secretary of the Board of Supervisors and of the Committee on Publications and the Committee on Ethics and Discipline, and shall keep the records of each in a separate volume. He shall have custody of all records as thus kept.

He shall issue notices of the meetings of the Council. One month before the annual meeting of the Society, he shall issue to every fellow a program, which shall contain notification of the time and place of the annual meeting, notification of the stated meetings of the Council for the year and the meetings of the boards of censors, and information concerning the payment of assessments and the distribution of publications.

He shall record the Proceedings of the Council and of the Society. He shall keep a complete list of the fellows of the Society, with their addresses so far as known. He shall transfer fellows from one district to another under the terms of Chapter III, Section 2, and shall report to the Society at its annual meeting the changes in membership of the Society during the year.

He shall conduct the official correspondence of the Society, and shall notify officers, delegates and members of the committees of the general Society of their appointments and of their duties.

Under the direction of the Committee on Publications he shall issue at such intervals as may be determined by

the Council a directory of officers and fellows of the Society, which shall be furnished upon request to fellows who are not in arrears.

He shall perform such other duties as the Society or the Council may require.

Section 5. An Executive Secretary shall be chosen by the Executive Committee of the Council upon nomination by the President. He shall hold office until his successor has been duly elected.

He shall perform such duties as are assigned to him in Section 4 of this chapter and by the Executive Committee. In general, he shall assist the officers of the Society and such standing and other committees as may request his services, and the Society shall have the first call upon his services.

He shall attend all meetings of the Council and, on request, attend the meetings of the Executive Committee of the Council, but shall not vote in either.

An Executive Secretary need not be a physician.

APPENDIX NO. 4

REPORTS OF COMMITTEES TO CONSIDER PETITIONS FOR RESTORATION TO THE PRIVILEGES OF FELLOWSHIP

Restoration to fellowship, with the usual provision regarding payment of dues, was recommended for the following three former members:

Julian C. Gant, Arlington (Committee: Edwin P. Stickney, Letitia D. Adams and Alfred Weller).

Charles H. Hogan, Salem (Committee: Charles L. Curtis, Thomas F. Henry and Stuart N. Gardner).

Arthur J. Taveira, New Bedford (Committee: Frank M. Howes, Edwin D. Gardner and Curtis C. Tripp).

APPENDIX NO. 5

COMMITTEES APPOINTED TO CONSIDER APPLICATIONS FOR RESTORATION TO FELLOWSHIP

The following committees were appointed to consider the petitions for restoration to fellowship of the following eleven former members:

For Bernard H. Appel, Brighton:

Max Ritvo, David Stern and Robert H. Aldrich.

For Harold I. Cohen, Lynn:

Charles F. Twomey, Bernard Appel and Charles L. Hoitt.

For Frederick E. Cruff, Norwell:

Bradford H. Peirce, Roy F. Littlehale and Charles Hammond.

For J. Frank Curtin, North Abington:

Joseph H. Dunn, John M. Peckham and Jonah Fieldman.

For Leroy S. Ford, Keene, New Hampshire:

Samuel N. Vose, Hollis L. Albright and Walter H. Lacey.

For Maurice Gerstein, Brookline:

Charles J. Kickham, Edward L. Kickham and Albert Ehrenfried.

For Elihu I. Lewis, Boston:

William T. O'Halloran, Mark D. Altschule and Nathan L. Fineberg.

For Coval H. Liverpool, West Somerville:

Charles W. Finnerty, John E. Gillis and Herbert Cholerton.

For John L. O'Toole, Haverhill:

William W. Perrin, Lucien R. Chaput and George J. Connor.

For Nathan Silverman, Lawrence:

John J. Deacy, John J. Kelleher, Jr., and Joseph A. Levek.

For Thomas V. Uniack, Lawrence:

Roy V. Baketel, Victor A. Reed and Henry F. Dearborn.

APPENDIX NO. 6

RESOLUTION PRESENTED BY THE COMMITTEE ON MEDICAL PREPAREDNESS

WHEREAS, The regulations of the Selective Service Act provide against deferment for military training of particular groups of persons; and

WHEREAS, These regulations provide for individual deferment of persons in any capacity deemed necessary for the national health, safety or interest, thus enhancing the efficiency of such individuals for a particular type of such needed service; and

WHEREAS, Physicians play an indispensable part in both the civilian and military aspects of the national defense program; and

WHEREAS, The needs for competently trained physicians will be greatly extended to meet both the civilian and military requirements of the present emergency; and

WHEREAS, A period of four years of intensive continuous training is required after a man enters a medical school and thereafter at least one year of hospital experience as an intern before he can be developed into a physician of any competence; and

WHEREAS, The Council of the Massachusetts Medical Society here records as its considered opinion that the future health needs and proper medical care of the nation and of the defense forces demand that there be no interruption in the stream of adequately trained physicians entering the ranks of the profession from medical schools and hospitals; therefore, be it

RESOLVED, That the Council and members of the Massachusetts Medical Society urge local and appeal selective-service boards in Massachusetts to give due and proper consideration to the medical needs of their respective communities when considering physicians for military service, to the end that the citizens of rural sections and small towns be not deprived of necessary health and medical services; and be it further

RESOLVED, That, to ensure a continuing supply of adequately trained physicians to meet the nation's medical needs of the future, the Council and members of the Massachusetts Medical Society urge local and appeal selective-service boards carefully and sympathetically to consider semiannual deferments on an individual basis, as provided in selective-service regulations, of students in recognized schools for medical teaching and of interns in hospitals until the completion of at least one year's internship; and be it further

RESOLVED, That copies of this resolution be sent to the Governor of the Commonwealth of Massachusetts, to directors of the federal and state selective-service system, and to the chairmen and members of all local and appeal selective-service boards within the Commonwealth.

REGINALD FITZ, *Chairman.*

MEDICAL PROGRESS

BACTERIOLOGY*

The Significance of Bacteriologic and Immunologic Procedures in the Diagnosis and Treatment of Infections

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WITH the development of powerful and specific agents for the treatment of infections, accurate diagnosis has become increasingly important. It is extremely difficult to handle a patient in diabetic coma without the aid of a chemical laboratory, and it is equally impossible to give satisfactory care to patients with serious infections without the assistance of a good bacteriologic laboratory. Consequently, the efforts of the Massachusetts Department of Public Health to improve the quality of bacteriologic work throughout the Commonwealth by a system of inspection and approval of laboratories is commended. With these considerations in mind, I shall discuss the present status of diagnostic procedures from the point of view of both the clinician and the laboratory man.

BACTERIOLOGIC PROCEDURES

Smears

With the refinement of laboratory methods, older and simpler tests are often forgotten. This has been true of the practice of examining stained smears of bacteriologic material. As a method of exact diagnosis, a smear has great limitations, but as a guide to the clinician and bacteriologist, it is of inestimable value. It gives a tentative indication of the type of infection in a few minutes, whereas cultures take at least eighteen hours, and it shows the proportions of various types of organisms in mixed infections, as well as the cellular reaction in the exudate.

Smears are particularly useful in the examination of exudates from sites normally sterile, such as serous cavities, the subarachnoid space and tissues. The importance of smear examination in cases of peritonitis and empyema cannot be over-emphasized, for cultures from these cases often fail to grow. A discussion of the valuable information yielded by smears of abdominal fluid obtained at laparotomy has recently been published.¹

Smears made from sites at which there are normally profuse bacterial flora are difficult to inter-

pret and usually fall to the lot of the medical man. Throat smears are extremely unreliable in the diagnosis of diphtheria and various forms of tonsillitis, and the physician should be guided by his clinical judgment from the appearance of the lesion and by properly taken cultures for confirmation. In pneumonia, the gross inspection of the sputum, in conjunction with examination of a stained smear, may yield valuable information, particularly in such unusual cases as Friedländer's pneumonia. In venereal diseases, smears may be very useful from a man, who normally has an almost sterile urethra, whereas those from the female cervix mean little unless frank pus is seen. Smears of urinary sediment are often more valuable than cultures, when the latter are done by simple broth inoculation. Perhaps the greatest use for smears in medical conditions is in examination of fluid aspirated from acutely inflamed joints, and of cerebrospinal fluid.

Certain pitfalls in smear examination are not commonly appreciated. All the gram-positive cocci—staphylococcus, pneumococcus and hemolytic streptococcus—tend to assume a diplococcal form when growing rapidly in the body, so that the finding of diplococci or short chains is not pathognomonic of a particular coccus, and one must accordingly be somewhat cautious in interpretation until cultures are made. Moreover, virulent hemolytic streptococci form capsules in rapidly spreading infections. In a case of peritonitis, recently observed, a smear showed gram-positive diplococci. These were taken to be pneumococci, and a Neufeld test was set up with Type 1 anti-pneumococcus serum. This showed large, apparently swollen capsules and was called positive. On the next day, culture revealed a pure growth of beta-hemolytic streptococcus, much to the bacteriologist's surprise.

Smears of the cerebrospinal fluid in meningitis may be quite confusing unless the physician is on his guard. The gram-positive cocci can be quite readily seen, but gram-negative meningococci may be very difficult to find. In children, meningitis due to the Pfeiffer bacillus (*Haemophilus influ-*

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enzae) is the commonest endemic form.² These organisms are frequently mistaken for meningococci by an inexperienced observer, because they may appear as gram-negative diplococci. They take stains with difficulty, and if *H. influenzae* infection is suspected, the smear should be stained with safranin for five or ten minutes, after which time the organisms will appear as quite small, very pleomorphic, gram-negative bacilli and cocci, often paired. Their early identification is essential, since specific rabbit-serum therapy offers the greatest hope in this highly fatal disease.^{3, 4}

Cultural Methods

Taking cultures. To obtain positive cultures from patients with infections, intelligent co-operation between the physician and his laboratory associates is needed. Swabs must be taken from the lesion itself, with as little contamination as possible. This is particularly true in throat cultures, when the results vary enormously with the technic of the person taking the cultures. It is hardly necessary to point out that swabs must be kept moist and planted as soon as possible, because most pathogenic organisms die more quickly than their saprophytic companions. Various technics have been devised for keeping the swabs moist and the organisms alive. If the material can be kept cold, dropping the swab in a tube of broth is a good policy. A few drops of physiologic saline solution or water in the bottom of the tube with the swab suspended a little above it may help. Never dip swabs in saline solution, since it is quite toxic for most organisms. An English worker devised an excellent scheme for meningococcus-carrier studies, which laboratories serving practitioners might well adopt. The bottom of the test tube is filled with a small amount of blood agar on which the swab is allowed to rest.⁵ As a general rule, all specimens do best if they are maintained at a temperature just above freezing during transport to the laboratory, rather than at warmer temperatures. This is particularly true of stool specimens, in which overgrowth of colon bacilli at room temperature will obscure the presence of a few pathogens.

Partial tension. A few tricks in the isolation of pathogenic organisms make a great difference. A slight increase in the carbon dioxide tension of the atmosphere stimulates the growth of bacteria. Furthermore, moisture has a marked effect, many organisms growing readily on fresh moist plates, and very poorly on old dry ones. The moisture can be conserved by covering the space between the Petri dish and its cover with Scotch tape or Parafilm, or by placing the Petri dishes in a museum or preserve jar, with moist blotting paper in the bottom and with a tightly fitting lid. Increased car-

bon dioxide tension can be secured in an individual plate culture by putting a small piece of carbon dioxide snow in the Petri dish cover, inverting the plate over it and sealing. For a group of plates in a jar, proper atmospheric conditions may be achieved by including several plates inoculated with *Bacillus subtilis*, as recommended by Fothergill and Sweet,⁶ or by lighting a candle in the jar and clamping the lid on tightly, as recommended by Nye and Lamb.⁷ I have found the latter method most convenient, because of its simplicity. The candle uses up a portion of the available oxygen, and produces water vapor and carbon dioxide; the last increases to about 3 per cent before smothering the flame, thus providing optimal conditions for the growth of such organisms as the meningococcus, gonococcus, *Streptococcus viridans*, hemolytic streptococcus, pneumococcus and staphylococcus. The first three organisms will frequently grow only under these mephitic conditions, whereas the others always grow more luxuriantly under them.

Anaerobiosis. Few laboratories have solved the problem of making satisfactory anaerobic cultures. It is extremely important, since many studies have shown that if routine anaerobic cultures could be done, a great many more isolations would be made. Even organisms like the hemolytic streptococcus and pneumococcus are occasionally obligatory anaerobes when first isolated. The inoculation of large (200 by 25 mm.) test tubes filled to at least half their depth with cooked-meat medium usually serves to support the growth of all anaerobic organisms, but isolation in pure culture from such tubes is difficult owing to the abundant growth of other bacteria. For single-colony isolation, no simple method has been devised, and one must use one of several cumbersome methods if anaerobic infection is suspected. The best method, which requires considerably less outlay than the original McIntosh-Fildes or Navy methods, is that devised by Weiss and Spaulding,⁸ and Spaulding and Goode,⁹ in which a jar is evacuated, filled with carbon dioxide, then re-evacuated and filled with hydrogen, which removes the remaining oxygen in the presence of palladinized asbestos as a catalyst. A chemical method that works fairly satisfactorily is that of Rosenthal,¹⁰ in which chromium is added to sulfuric acid, first liberating hydrogen, and later removing the oxygen by an oxidation of the chromous compound formed.* These methods make possible the inoculation of plates and the isolation of single colonies for identification. Brewer¹¹ has devised an extremely simple semisolid medium in which all anaerobes tested will grow and which is incubated aerobically. This

*This method has been greatly improved by Mueller and Miller.¹²

method is ideal for ascertaining the sterility of vaccines, toxic filtrates, and serums, but, of course, does not permit the isolation of organisms in pure culture. Its use as an anaerobic blood-culture medium has possibilities still to be explored. Cantor¹² has recently published an ingenious method with which he claims to be able to grow aerobes, mephitic organisms and anaerobes in the same plate incubated aerobically, and with this he can make single colony isolations.

Staphylococci. Staphylococci are so frequently isolated that it is difficult to assess their significance. The production of yellow pigment, although usually characteristic of virulent staphylococci, is not an adequate criterion of virulence, nor is hemolysis on blood-agar plates. The production of coagulase^{13, 14} seems to be quite closely correlated with human virulence, and can easily be tested. A staphylococcal colony or a loop of broth culture is emulsified in 0.5 cc. of citrated human plasma. If this clots within three hours at room temperature, the strain is strongly coagulase positive; if it clots after incubation overnight, it is weakly coagulase positive; and if it remains fluid, the strain is coagulase negative and probably not virulent. Julianella¹⁵ finds that the fermentation of mannite parallels the coagulase test, but it takes much longer. This test is very useful in determining whether a staphylococcus obtained in a blood culture is a probable invader or a probable contaminant, since most of the former are coagulase positive and the latter coagulase negative.

Streptococci. The proper identification of beta-hemolytic streptococci is extremely important, because infections with these organisms require treatment with sulfanilamide rather than sulfathiazole, and treatment should be continued for a long period to avoid relapses. Unfortunately, many laboratories are unaware of certain peculiarities of these organisms that make their identification difficult. A strain isolated from one of the severest infections seen at the Peter Bent Brigham Hospital was called *Streptococcus viridans* in the laboratory of another institution, because only surface inoculation of blood agar was used. The hemolysin that characterizes beta-hemolytic streptococci is inactivated by oxidation. Consequently, many strains do not produce clear zones of hemolysis on the surface of blood-agar plates, but do so only when pour plates are made and the colonies, growing deep in the agar, are protected from the direct effect of molecular oxygen. For this reason, pour plates containing 5 per cent horse, rabbit or sheep blood in infusion agar should always be made when hemolytic streptococci are suspected, that is, with throat swabs, mastoid swabs and

so forth. Dextrose-agar cannot be used, because the presence of dextrose often makes a true beta-hemolytic streptococcus produce green hemolysis. A further reason for making pour plates is that from their appearances beta-hemolytic streptococci of Groups A, B and C¹⁶ can be tentatively identified. Since Group B and Group C infections differ considerably in their course and response to sulfonamide drugs, this identification is of some practical value. If pour plates cannot be made, a simple expedient is to cut under the surface of the agar with the inoculating loop.

Another source of confusion is *Haemophilus haemolyticus*, or so-called "Bacillus X," which produces beta hemolysis both on the surface and in deep pour plates. The use of sheep's blood obviates this difficulty, since it inhibits the growth of this organism.¹⁷ If horse or rabbit blood is used, several hemolytic colonies must always be fished and smeared to make sure that no gram-negative filamentous bacilli are present and that the hemolytic organisms are gram-positive cocci. Mueller and Whitman¹⁸ found that dipping the swab in a dilute solution of disodium phosphate for an hour would get rid of *H. haemolyticus*.

Diphtheria bacilli. The isolation of the diphtheria bacillus from throat cultures has been greatly simplified by the introduction of tellurite-agar plates.¹⁹ On these plates the bacillus forms gray to black colonies. A tellurite-agar plate and Loeffler's slant should be inoculated with each swab. If the former shows suspicious colonies, a stained smear of the Loeffler's slant should be examined, since morphology of the organisms on tellurite agar is atypical. Inspection of the colonies will give an indication of whether the organisms are of the gravis, intermedius or mitis type, the mortality from the disease and the frequency of complications being closely correlated with the type of infection.²⁰

Meningococci. Cultures of spinal fluid in cases of meningitis should be made as rapidly as possible and on fresh chocolate-agar slants or plates, since this is the only medium that will grow all the organisms frequently causing meningitis (*H. influenzae* does not grow well on blood agar). At least one plate should be incubated in a candle jar, since increased carbon dioxide tension is necessary for growth of the meningococcus.

Gonococci. The culture of gonococci has been greatly improved and standardized in recent years, through the efforts of a number of workers. A few simple points deserve emphasis. The conditions for successful isolation seem to be the following: suitable mediums, fresh moist plates, slightly increased carbon dioxide tension and a

temperature evenly maintained at 36°C. The method of McLeod et al.,²¹ as adapted by Leahy and Carpenter,²² has become standard in many laboratories. This involves the use of chocolate-agar plates, incubation in a candle jar or similar container at 36°C. for forty-eight hours, and detection of colonies, when they cannot be identified by inspection and smear, by the oxydase reaction, using the dye para-amino-dimethyl-aniline-mono-hydrochloride. Other methods have been devised,^{23, 24} and one may expect further improvements in the coming years, since chemotherapy has emphasized the importance of cultural methods in ascertaining cures. It seems likely that the use of more than one type of medium may increase the percentage of positive cultures, since certain strains grow poorly on chocolate agar but luxuriantly on 20 per cent blood-dextrose agar. It must be emphasized that the gonococcus is an extremely delicate organism. In taking cultures, all anti-septic agents must be washed away from the genitalia after cleansing, and in females no lubricating jelly, other than plain sterile vaseline, should be used on the speculum, since such jellies contain antiseptics lethal to the organism.²⁵ Swabs must be planted as soon as possible, or kept in a small amount of ascitic fluid or broth, preferably in the cold until they can be planted. It is possible that the technic mentioned above of allowing the swab to rest on a small amount of blood agar in the bottom of a sterile tube during transportation may be satisfactory.

In differentiating gonococci and meningococci, agglutination tests, as well as agglutinin-absorption tests, are of little or no value because of the presence of cross agglutinins; sugar-fermentation tests in infusion broth containing ascitic fluid, which are controlled by tests set up with known strains, are usually employed.

Stool cultures. Cultures of the stool should be taken whenever possible in cases of acute and chronic diarrheal disease. Despite the marked fall in the incidence of typhoid fever, outbreaks of milder forms of enteric disease remain far too prevalent. These are caused mainly by members of the salmonella (paratyphoid) or dysentery groups. It should be stressed that, whereas in typhoid fever, stool cultures do not become positive until the later stages of the disease, in dysentery, stool cultures may be positive only during the first twenty-four to forty-eight hours. Since sulfaguanidine has been developed for the therapy of these infections,²⁶ accurate bacteriologic examination of fecal specimens becomes more important. Stool cultures should always be made within an hour or two after passage of the sample, or at least

the specimen should be kept cold until delivery to the laboratory. Otherwise, colon bacilli, which always outnumber the pathogens, will overgrow the latter to such an extent that the culture may be reported as negative.

Refinements in the technic involve the use of enrichment methods²⁷ and of newer mediums to supplant the time-honored eosin-methylene blue agar or Endo's agar plates. For general work, Leifson's²⁸ mediums—desoxycholate agar and desoxycholate citrate agar—seem to be the most satisfactory, since they permit heavy inoculation and a very clearcut differentiation between lactose-fermenting and nonlactose-fermenting strains.²⁹ For typhoid work only, Wilson and Blair's³⁰ bismuth sulfite agar is excellent, and could be used with advantage by all health-department laboratories in following the stools in cases of typhoid fever to see when the patients are ready for discharge.

Blood cultures. Blood cultures properly constitute a large part of the work of every diagnostic laboratory, since a positive blood culture is almost always significant. Contamination of blood cultures is relatively easy, and especial pains should therefore be taken to sterilize the skin thoroughly before venipuncture is performed, and to avoid any contamination with air-borne organisms. Most laboratories take blood cultures by direct inoculation of a flask of broth at the bedside. The citrate method is little more trouble to use and yields a great deal more information. Ten cubic centimeters of blood is removed and inoculated into a vial or flask containing 3 cc. of 2.5 per cent solution of sodium citrate, which prevents clotting. In the laboratory measured amounts (1 and 2 cc.) of blood are pipetted into two Petri dishes, and 10 cc. of dextrose infusion agar is poured into one and 10 cc. of plain infusion agar into the other. The remainder is pipetted into a flask of broth. The advantages of this method are: first, that it enables the laboratory to inoculate the type of medium best suited to the isolation of any particular organism; secondly, that it enables the bacteriologist to count the number of colonies per cubic centimeter of blood, giving a quantitative estimate of the degree of bacteremia; and thirdly, that more rapid identification of the organisms can be made from the type of hemolysis and appearance of the colonies when they grow out on the surface of the agar.

The choice of mediums for blood culture has always aroused considerable dispute.³¹ For routine purposes, dextrose infusion broth, dextrose infusion agar and plain infusion agar, the latter included for the identification of the beta-hemolytic

streptococcus, which produces alpha hemolysis in dextrose agar, will be found satisfactory. For isolation of the gonococcus, meningococcus and *Streptobacillus moniliformis*, the addition of 30 per cent ascitic fluid or animal serum is recommended. The isolation of *Brucella abortus* from the blood is often quite difficult,³² but 2 per cent tryptose broth and agar are recommended by Hudson et al.³³ Duplicate cultures should be set up aerobically and in a jar with 10 per cent carbon dioxide, which is necessary for the growth of *Brucella abortus*. In cases of suspected gas gangrene, puerperal sepsis or undiagnosed sepsis, at least one flask and plate should be incubated anaerobically, since anaerobic organisms invade the blood at times, particularly in these conditions. When gonococemia, meningococemia or subacute bacterial endocarditis is suspected, or when previous cultures have been negative in cases of suspected bacteremia, cultures should be incubated under partial tension with a candle jar or with *B. subtilis* cultures in the jar. All routine blood cultures should be held at least one week; cultures in suspected cases of subacute bacterial endocarditis, undulant fever, meningococemia or gonococemia should be kept three weeks before being discarded as negative.

Cultures from patients receiving sulfonamides
Since the introduction of sulfonamide therapy, the isolation of organisms from the body fluids of patients under treatment with these drugs has often been very difficult. Although such fluids frequently become sterile, cultures may be negative when viable organisms are present because of the marked in vitro bacteriostatic effect of the drug present in the inoculum. The discovery that *p*-aminobenzoic acid would inhibit the action of the sulfonamide drugs in vitro and in vivo^{34, 35} has made it possible to overcome this difficulty.³⁶ Para-aminobenzoic acid can be added to all routine culture mediums in a concentration of about 5 mg per 100 cc during their preparation and will withstand autoclaving at a pressure of 15 pounds for twenty minutes.³⁷ It has been found that if sputum from a patient with pneumonia who has been on chemotherapy is emulsified with an equal amount of a 0.1 per cent solution of *p*-aminobenzoic acid in saline and injected into a mouse, typable pneumococci may be obtained more rapidly and more regularly than when the sputum is injected alone.

IMMUNOLOGIC PROCEDURES

In addition to the direct evidence that the laboratory can supply by the isolation of the causative agent in infectious disease, indirect evidence of the nature of an infection may often be obtained by immunologic tests.

Skin Tests

Skin tests have been used for many years in medicine and are essentially of two types: those that depend on the direct toxic action of the injected material, and those that depend on a hypersensitiveness of the subject to the test substance.

The tests that depend on the toxicity of the test substance are the Schick and Dick tests for the detection of susceptibility to diphtheria and scarlet fever. A measured amount of toxin is injected into the skin. In a susceptible subject the toxin exerts its typical action—the production of an indurated, painful reddened lesion in three days with the Schick test, and of an area of erythema in twenty-four hours with the Dick test. If the subject has a level of circulating antitoxin arbitrarily considered sufficient to protect him from the disease, the injected toxin will be neutralized and no reaction will result. These tests may be misleading, particularly in adults, for in a person previously immunized by injection or contact with the offending organism, there may be little circulating antitoxin, but the cells may possess the ability to elaborate antitoxin very rapidly in response to a slight stimulus. Thus, two weeks after a positive Schick test, a repeat test may be negative, because the test injection has stimulated antitoxin production. Skin tests cannot be used to test for tetanus antitoxin, since tetanus toxin does not affect the skin. The reverse of the Dick test is made use of in the Schultz-Charlton test, in which scarlatinal antitoxin is injected into the skin of a patient with a red rash. If there is blanching at the site in twelve hours, the rash is considered to be scarlatinal.

Most skin tests depend on a state of hypersensitiveness induced by previous contacts with the test substance. This hypersensitiveness tends to assume one of two forms, which perhaps represent different degrees of the same thing, since in certain cases both forms appear at different times. Using Zinsser's³⁸ classification, one can divide hypersensitiveness into the anaphylactic type, in which circulating antibodies are present and therefore the hypersensitiveness can be transferred by injection of the serum into another person, and the allergic type, in which no humoral antibodies can be found, so that passive transfer is impossible. In the anaphylactic type, the injection of the test substance results in its union with and probable precipitation of the antibodies that exude into the site of injection. Such antigen-antibody complexes are extremely irritating and lead to the local liberation of a substance like histamine. Consequently the typical histamine reaction, a wheel with a zone of erythema about it, appears in about fifteen min-

utes and disappears within an hour or two. In the allergic type of reaction, nothing appears at the site for a number of hours, then induration, pain and redness occur, and in two or three days there is a hard, swollen, tender lesion, which resolves slowly and may even slough at its center. This appears to be due to an inherent sensitivity of the cells themselves, since tuberculin sensitivity has been demonstrated by the cells of a tuberculin-positive guinea pig after they have grown many generations in tissue culture.³³ In both types of reaction, the skin itself must possess the power to

injected antibody and to give a reaction. If normal rabbit serum is used, this reaction will not occur to confuse the issue.

Serologic Tests

Serologic tests are used in the diagnosis of disease on the assumption that the development of antibodies against a particular infectious agent or some of its products is evidence that the patient has suffered from an infection due to that particular agent. This assumption is based on two premises: that antibodies are specific, and that their

TABLE 1. *Clinically Important Skin Tests.*

CONDITION	TEST SUBSTANCE	REMARKS
IMMEDIATE (ANAPHYLACTIC) REACTIONS		
Asthma, hay fever, food allergy, serum sensitivity and so forth	Extracts of pollens, foods, serum and so forth	Some patients skin sensitive without symptoms
Helminth infections (trichiniasis, ^{40 41} echinococcal disease)	Extract of worms	In trichiniasis delayed reaction first, later replaced (14-20 days) by immediate reaction
Pneumococcal pneumonia (Francis test ^{42 43})	1:10,000 dilution of capsular polysaccharide of infecting type	Patient must be tested before treatment is begun. If test positive then, cannot be used. If negative, first appearance of positive test after serum administration indicates development of excess of antibody.
DELAYED (ALLERGIC) REACTIONS		
Tuberculosis*	Old tuberculin, P.P.D. (purified protein derivative) better ⁴⁴	
Brucellosis*	Brucellergen, ^{45 46} brucella vaccine	
Tularemia*	Detoxified <i>Past. tularensis</i> vaccine (Foshay ⁴⁶)	
Lymphopathia-venerea (lymphogranuloma-inguinale) (Frei test)	Inactivated bubo pus, ⁴⁷ inactivated infected mouse brain, ⁴⁸ inactivated infected chick-embryo extract ⁴⁹	The last test material is recommended as most satisfactory; all but the first are commercially available.
Chancroid (dmeleus test)	Vaccine (Duerey's bacillus)	Seldom needed for diagnosis
Pseudoreactions (Dick and Schick tests)	Schick and Dick controls (culture filtrate heated to inactivate toxin)	Due to hypersensitivity to bacterial protein in culture filtrate

*The test remains positive for many years after infection, whether clinical or subclinical. Therefore, its value in diagnosis is in inverse ratio to the frequency of exposure to the infection. Negative tests are valuable in excluding infection.

react to the irritation, and in moribund patients this often disappears.

A summary of skin tests that are of greatest value in the diagnosis and treatment of disease is given in Table 1.

Foshay⁴⁶ has described a sort of reverse Francis test for the early diagnosis of tularemia. Instead of injecting antigen to detect antibodies, he injects antibody to detect antigen. Since the antigen is apt to be circulating early in a disease like tularemia, the injection of specific antiserum is apt to give an immediate reaction. Such tests are seldom necessary and must be carefully controlled with normal serum of the same species. However, Foshay's work is important in emphasizing that skin tests for serum sensitivity must be done with normal serum. Thus, for example, in Type 1 pneumonia, if the rabbit serum to be used in treatment is diluted and injected intradermally, the test is frequently positive, because enough capsular polysaccharide usually circulates to unite with the

formation is always induced by a specific stimulus. These premises have a solid immunologic foundation, because specificity is the most striking characteristic of serologic reactions. But one must be exceedingly cautious in defining specificity. Antibodies have a specific affinity for certain chemical groupings or spatial arrangements, as the work of Landsteiner⁵⁰ and many others has shown, but there is nothing to prevent these groupings from occurring in a number of bacteria and viruses. It is this sharing of chemical groupings by dissimilar organisms that gives rise to bizarre phenomena, such as the Weil-Felix reaction, in which the serum of a patient with typhus agglutinates a certain strain of *Proteus*. As Castaneda⁵¹ has shown, this agglutination is due to the presence of a certain carbohydrate in both the typhus rickettsia and this strain of *Proteus*. Furthermore, in patients who possess antibody against one antigen, the stimulation of antibody production by another infection may produce a rise in the titer of anti-

body against the first antigen as well; this is known as the *anamnestic* reaction.

Since antibodies develop in response to an infection, samples of blood should be drawn early in an infection to serve as a control against later ones. If a single sample of convalescent serum shows antibodies, it means little, but if a sample taken near the onset shows no antibodies, the positive test later means a great deal. To interpret a single serologic test it is necessary to know the frequency of positive tests in the section of the population to which the patient belongs, the titers that can be considered within normal limits and the past history of the patient.

All serologic reactions depend on a union of the antibody in the serum with the antigen for which it has a specific chemical affinity. This union is the fundamental reaction, but it cannot be detected unless secondary reactions take place, which depend on the physical state of the antigen and the conditions of the test.⁵² If the antigen is in solution (for example, horse serum) and antibody is added in a test tube, a precipitate will form, if electrolytes are present. If the antigen and antibody unite in the body, anaphylactic reactions occur that give rise to an immediate type of reaction in the skin and to anaphylactic shock in the internal organs. If the antigen is particulate (bacteria or colloidion particles coated with a soluble antigen⁵³), agglutination will occur when antibody is added in the presence of electrolytes. In the presence of leukocytes, phagocytosis will take place. If complement is present when union of antigen and antibody occurs, it will be fixed by the antigen-antibody complex, and its fixation can be tested by the addition of sensitized sheep cells; such tests must be used when the bacteria will not form satisfactory agglutinating suspensions, as with the gonococcus, or when the antigen cannot be obtained in pure solution, as with virus infections.

The reaction of antigen and antibody has certain peculiarities due to the colloidal nature of antibodies, which account for the zone effects, seen particularly in high-titer serums. Thus, when a patient's serum agglutinates typhoid bacilli to a dilution of 1:2560, there may be very little agglutination below a dilution of 1:80 or 1:160. This is a very strong argument for the use of the test-tube agglutination method with graded dilutions instead of slide agglutination, in addition to the fact that it gives much better quantitative results. Furthermore, the colloidal nature of these reactions requires that they be carried on under relatively constant conditions with regard to pH and concentration of antigen, if results are to be reproducible. Thus, the bacterial suspension used for agglutination reactions must be standardized

in some way, the simplest being comparison with turbidity standards of barium sulfate.⁵⁴ Test tubes must be thoroughly rinsed after cleaning, since alkalinity from residual soap or acidity from residual cleaning solution will markedly affect the sensitivity of the test. The isoelectric point of most bacteria is in the neighborhood of pH 4.0, and at this point they will flocculate spontaneously, whereas the isoelectric point of the antibodies with which they unite is about 5.6, and at this point agglutination would theoretically be most marked, but not necessarily specific.

Below is given a list of the serologic tests that are of proved value in the diagnosis of disease, with some comments.

PRECIPITATION TESTS

Syphilis (Hinton, Kahn, Kline, Kolmer and Eagle tests). These are very useful, since their ease of performance and high sensitivity make them ideal for the exclusion of syphilis. A comparison of the various tests has been made.^{55, 56}

Parasitic Infections. In trichiniasis and echinococcal disease, patients usually develop high titers of precipitins, as well as positive skin tests.^{40, 41}

Pneumonia. Test for the presence of capsular polysaccharide in the blood and urine may be a valuable guide to prognosis and thus to therapy.⁵⁷

Spinal Fluid. A ring at the interface between spinal fluid and influenzal or meningococcal antiserum indicates meningitis with the corresponding organism.²

AGGLUTINATION TESTS

Brucellosis. Agglutinins when present in titer of 1:80 or more are usually significant. The test is often negative in chronic infections or may be positive in normal subjects in endemic areas, particularly after acute infections.⁵⁸

Tularemia. Agglutinins nearly always rise, usually to high titers, and persist for many years.

Pneumonia. Agglutinins are considered by many to be the most satisfactory method for titrating antibodies.⁵⁹

Dysentery. Agglutinin titer seldom rises high. Occasionally an agglutination test is useful, when positive stool cultures are not obtained. Tests with the Sonne and Shiga types are quite specific; the Flexner group is antigenically heterogeneous.

Salmonella Infections. In this group of infections, agglutination tests are of great value. The work of Kauffmann and White⁶⁰ has revealed an extraordinary number of antigens in the group. A properly performed Widal test should include the various organisms that cause enteric fever in the local area. For New England this would be *Eberthella typhosa*, *S. schottmulleri* (paratyphoid B), *S. suispestifer*, *S. enteritidis* and *S. aertrycke*. Two types of agglutination occur: the so-called "H" or flagellar agglutination due to sensitization of the flagellar antigens, and the "O" or somatic agglutination caused by sensitization of the bacterial bodies. H agglutination

is rapid (two hours at 55°C.), and large floccules are formed. O agglutination requires six to twelve hours at 55°C., and fine granular masses are formed. To detect O agglutinins either a nonmotile strain or a specially prepared suspension treated with heat to destroy the H antigen must be used. O agglutinations are very important in doubtful cases, because although a high H agglutinin titer may be produced by prophylactic vaccination or the anamnestic reaction, O agglutinins seldom appear above a titer of 1:80 except in response to infection, when they usually parallel H agglutinins.⁶¹

Infectious Mononucleosis (heterophil agglutinin test).

Serums in this disease agglutinate sheep and ox red blood cells in high titers. This may be associated with a false positive serologic test for syphilis.⁶²⁻⁶⁴

Rickettsial Infections (Weil-Felix reaction). Patients recovering from rickettsial infections agglutinate certain *Proteus* strains. Typhus group agglutinates OX₂ and OX₁₉, tsutsugamushi group OX-K, spotted fever group both strains.⁶⁵

COMPLEMENT-FIXATION TESTS

Syphilis (Wassermann test).

Gonococcal Infections. The gonococcal complement-fixation test is much abused. Antibodies appear only infrequently in response to local genitourinary infections, but do appear in a high percentage of cases of endocarditis and arthritis. The test is useless in following the course of local gonorrhea, but very useful in the differential diagnosis of arthritis and bacterial endocarditis.

Serologic Diagnosis of Diseases Due to Filterable Viruses

Since filterable viruses cannot be grown on ordinary culture mediums and are often isolated with the greatest difficulty by experienced investigators, the diagnosis of these diseases is impossible for the ordinary laboratory. Isolation of the virus is seldom feasible, but the diagnosis of some of these infections by serologic tests is a practicable procedure in well-equipped laboratories, such as those of the Rockefeller Institute, the National Institute of Health or the bacteriology departments of the large medical schools. In virus diseases it is very important to collect serum in the acute stage of the disease and then at the optimum time for the appearance of antibodies, usually three or four weeks after the onset. In many virus diseases, soluble antigens, chemically and immunologically distinct from the virus itself,^{66, 67} have been found, and antibodies to these antigens appear in the serums of convalescents usually somewhat earlier than protective antibodies against the virus. These antibodies can be detected by complement fixation, and have been used in the diagnosis of influenza,⁶⁸ lymphocytic choriomeningitis,⁶⁷ psittacosis⁶⁹ and lymphogranuloma ingui-

nale.⁷⁰ Antibodies to the virus itself must be detected by their ability to prevent the development of disease in response to a known strain of virus in laboratory animals. Such neutralization or protection tests are widely used in investigative work.

REFERENCES

- Steinberg, B. Peritoneal exudate a guide to the diagnosis and prognosis of peritoneal conditions. *J. A. M. A.* 116:572-578, 1941
- Fothergill, L. D. *Hemophilus influenzae* (Pfeiffer bacillus) meningitis and its specific treatment. *New Eng. J. Med.* 216:587-590, 1937
- Alexander, H. E. Type "B" anti-influenza rabbit serum for therapeutic purposes. *Proc. Soc. Exper. Biol. & Med.* 40:313, 1939.
- Davies, J. A. V.: unpublished data.
- Downie, A. W. Survival of meningococci on swabs and blood agar. *Lancet* 2:36, 1940
- Fothergill, L. D. and Sweet, L. K. Meningitis in infants and children with special reference to age-incidence and bacteriologic diagnosis. *J. Pediatr.* 2:696-710, 1933
- Nye, R. N. and Lamb, M. E. Increased carbon dioxide tension as an aid in primary isolation of certain (mephitic) pathogenic bacteria. *J. A. M. A.* 106:1075, 1936.
- Weiss, J. E. and Spaulding, E. H. A simple method for obtaining effective anaerobiosis. *J. Lab. & Clin. Med.* 22:726-728, 1937
- Spaulding, E. H. and Goode, W. G. Anaerobic cultivation as routine bacteriologic procedure in clinical laboratory. *J. Lab. & Clin. Med.* 25:305-314, 1939.
- Rosenthal, L. "Chromium sulphuric acid" method for anaerobic cultures. *J. Bact.* 34:317-320, 1937.
- Brewer, J. H. A clear liquid medium for the "aerobic" cultivation of anaerobes. *J. Bact.* 39:10, 1940
- Cantor, A. The maintenance of aerobic, micro aerophilic, and anaerobic conditions in a petri dish. *J. Bact.* 41:155-170, 1941
- Chapman, G. H., Berens, C., Peters, A. and Curcio, L. Coagulase and hemolysin tests as measures of the pathogenicity of staphylococci. *J. Bact.* 28:343-363, 1934.
- Fisher, A. M. The plasma coagulating properties of Staphylococci. *Bull. Johns Hopkins Hosp.* 59:393-414, 1936.
- Julianelle, L. A. Determination of staphylococcal types by fermentation of mannite. *Proc. Soc. Exper. Biol. & Med.* 36:117-119, 1937
- Rantz, L. A. and Jewell, M. L. The relationship of serologic groups A, B, and C of Lancelfield to the type of hemolysis produced by Streptococci in poured blood agar plates. *J. Bact.* 40:19, 1940
- Krumwiede, E. and Kuttner, A. G. A growth inhibitory substance for the influenza group of organisms in the blood of various animal species. *J. Exper. Med.* 67:429-441, 1938
- Mueller, J. H. and Whitman, L. An improved method for the detection of hemolytic streptococcus carriers. *J. Bact.* 21:219-223, 1931
- Anderson, J. S., Happold, F. C., McLeod, J. W. and Thomson, J. G. On the existence of two forms of diphtheria bacillus—*B. diphtheriae gravis* and *B. diphtheriae mitis*—and a new medium for their differentiation and for the bacteriological diagnosis of diphtheria. *J. Path. & Bact.* 34:667-681, 1931.
- Cooper, K. E., Happold, F. C., McLeod, J. W. and Woodcock, H. E. de C. Review of the observations which have accumulated with regard to the significance of diphtheria types in the last four years (1931-1935). *Proc. Roy. Soc. Med.* 29:1029-1054, 1936
- McLeod, J. W., Coates, J. C., Happold, F. C., Priestley, D. P. and Wheatley, B. Cultivation of the gonococcus as a method in the diagnosis of gonorrhea with special reference to the oxydase reaction and to the value of air reinforced in its carbon dioxide content. *J. Path. & Bact.* 39:221-231, 1934.
- Leahy, A. D. and Carpenter, C. M. The diagnosis of gonococcal infections by the cultural method. *Am. J. Syph., Gonorr. & Ven. Dis.* 20:347-363, 1936.
- Cohn, A. and Kruger, R. G. Hemolyzed beef or sheep blood media for isolation of the gonococcus. *Am. J. Syph., Gonorr. & Ven. Dis.* 24:295-300, 1940
- Pitts, A. C. The laboratory diagnosis of gonococcal infection. *Am. J. Syph., Gonorr. & Ven. Dis.* 24:184-200, 1940
- Gillick, F. G., Sulkin, S. E. and Stephens, L. J. A common error in obtaining specimens for the cultural diagnosis of gonococcal infection in women. *Ven. Dis. Inform.* 21:288-290, 1940
- Marshall, E. K., Jr., Bratton, A. C., White, H. J. and Litchfield, J. T. Jr. Sulfanilylguanidine a chemotherapeutic agent for intestinal infections. *Bull. Johns Hopkins Hosp.* 67:163-188, 1940.
- Jones, E. R. The use of brilliant green eosin agar and sodium tetrathionate broth for the isolation of organisms of the typhoid group. *J. Path. & Bact.* 42:455-467, 1936
- Leifson, E. New culture media based on sodium desoxycholate for the isolation of intestinal pathogens and for the enumeration of coliform bacilli in milk and water. *J. Path. & Bact.* 40:581-599, 1935
- Hardy, A. V., Watt, J., De Capito, T. M. and Kolodny, M. H. Studies of acute diarrheal diseases. I. Differential culture media. *Pub. Health Rep.* 54:287-300, 1939.
- Wilson, W. J. and Blair, E. M. McV. Use of a glucose bismuth sulphite iron medium for the isolation of *B. typhosus* and *B. proteus*. *J. Hyg.* 26:374-391, 1927.
- Penfold, J. B., Coldman, J. and Fairbrother, R. W. Blood cultures and selection of media. *Lancet* 1:65-67, 1940
- Poston, M. A. Studies on chronic brucellosis. III. Methods used in obtaining cultures. *Pub. Health Rep.* 53:1-4, 1938
- Huddleson, J. F., Hardy, A. V., Debono, J. E. and Gilmer, W. *Brucellosis in Man and Animals.* 339 pp. New York Commonwealth Fund, 1939

- 34 Woods D D The relation of p-aminobenzoic acid to the mechanism of the action of sulphathiazole *Brit J Exper Path* 21:74 90 1940
- 35 Selow F R The inhibition of the action of sulphanilamide in mice by p-aminobenzoic acid *Brit J Exper Path* 21:90 93, 1940
- 36 Strauss E, Lowell F C and Finland M Observations on the inhibition of sulfonamide action by para-aminobenzoic acid *J Clin Invest* 20:189 197, 1941
- 37 Janeway C A Method for obtaining rapid bacterial growth in cultures from patients under treatment with sulfonamides *J Clin Invest* 11:941 1941
- 38 Zinsser, H Enders, J F and Fothergill, L D *Immunity Principles and application in medicine and public health* 801 pp New York Macmillan Co. 1939 Pp. 340-339
- 39 Moon J A Tissue culture studies on bacterial hypersensitivity per se in *vitro* of inherent sensitivity to tuberculin of cells from tuberculous animals *J Exper Med* 64:943 951 1936
- 40 Spink W W Trichinella antigen further observations on its use in the diagnosis of trichinosis *New Eng J Med* 216:5 8 1937
- 41 Damm G J Trichinosis report of a case with demonstration of the larva in the arterial blood *New Eng J Med* 224:357 360 1941
- 42 Francis T Jr The value of the skin test with type specific capsular polysaccharide in the serum treatment of Type I pneumococcus pneumonia *J Exper Med* 57:617 631 1933
- 43 Wood W B Jr The control of the dosage of antiserum in the treatment of pneumococcal pneumonia II The clinical application of the Francis skin test *J Clin Investigation* 19:105 121 1940
- 44 Long E R and Seibert F B Further studies on purified protein derivatives of tuberculin (PPD) its diagnostic value and keeping, qualities in dilution *Am Rev Tuberc* 35:281 295 1937
- 45 Evans A C Robinson F H and Baumgartner L Studies on chronic brucellosis IV Evaluation of diagnostic laboratory tests *Pub Health Rep* 53:1507 1525, 1938
- 46 Fohay L Tularemia a summary of certain aspects of the disease including methods for early diagnosis and the results of serum treatment in 600 patients *Medicine* 19:1 83 1940
- 47 Frei W Eine neue Hautreaktion bei Lymphogranuloma inguinale *Klin Wochenschr* 4:2148 1925
- 48 Grace A W and Suskind P H The use of standardized mouse brain antigen for performance of Frei test for lymphogranuloma inguinale *J A M A* 107:1359 1365 1936
- 49 Grace A W, Rake G and Shaffer, M F A new material (Lycranum) for performance of the Frei test for lymphogranuloma venereum *Proc Soc Exper Biol & Med* 43:259 263, 1940
- 50 Landsteiner K *The Specificity of Serological Reactions* 178 pp Baltimore Charles C Thomas 1936
- 51 Castaneda, M R The antigenic relationship between *Bacillus proteus* X19 and *Rickettsiae* III A study of the antigenic composition of the extracts of *Bacillus proteus* X19 *J Exper Med* 62:289 296 1935
- 52 Mudd S, Lucke, B, McCutcheon M and Strumia, M On the mechanism of opsonin and bacteriotropin action VI Agglutination and tropin action by precipitin sera characterization of the sensitized surface *J Exper Med* 52:313 329, 1930
- 53 Cannon P R and Marshall C E An improved serologic method for the determination of the precipitative titer of antisera *J Immunol* 33:365 376, 1940
- 54 McFarland cited by Zinsser H and Bayne Jones S *Textbook of Bacteriology* Eighth edition 990 pp New York D Appleton Century Co. 1939 P 938
- 55 *The Evaluation of Serodiagnostic Tests for Syphilis in the United States* Supp No 1 Venereal Disease Information 49 pp Washington D C 1935
- 56 *The Serodiagnosis of Syphilis* Supp No 9 Venereal Disease Information 224 pp Washington D C 1939
- 57 Bullowa, J G M Bukantz S C and de Gora P F The balance between capsular polysaccharide and antibody in relation to the prognosis and therapy of pneumococcal pneumonia *Ann Int Med* 14:1348 1359 1941
- 58 Menefee E E Jr and Posien M A Significance of standard laboratory procedures in diagnosis of brucellosis *Am J M Sc* 197:646 653 1939
- 59 Finland M Brown J W and Rieth A E Treatment of pneumococcal meningitis *New Eng J Med* 218:1033 1044 1938
- 60 Kauffmann and White cited by Topley and Wilson⁶¹ Pp. 546 550
- 61 Topley W W C and Wilson G S *The Principles of Bacteriology and Immunology* Second edition 1645 pp Baltimore William Wood & Company 1936 Pp. 1205 1213
- 62 Paul J R and Bunnell W W The presence of heterophile antibodies in infectious mononucleosis *Am J M Sc* 133:90 104 1937
- 63 Davidsohn I Test for infectious mononucleosis *Am J Clin Path Tech Supp* 2:56 60 1938
- 64 Bernstein A False positive Wassermann reactions in infectious mononucleosis *Am J M Sc* 196:79 83 1938
- 65 Zinsser, H *The rickettsial diseases varieties epidemiology and geographical distribution* *Am J Hyg* 25:430 463 1937
- 66 Hughes T P A precipitin reaction in yellow fever *J Immunol* 25:275 294 1933
- 67 Smadel J E, Baird R D and Wall M J A soluble antigen of lymphocytic choriomeningitis I The separation of the soluble antigen from the virus *J Exper Med* 70:53 66 1939
- 68 Hoyle L and Fairbrother R W Antigenic structure of influenza viruses the preparation of elementary body suspensions and the nature of complement fixing antigen *J Hyg* 37:512 520 1937
- 69 Meyer, A T and Eddie B Value of complement fixation test in diagnosis of psittacosis *J Infect Dis* 65:225 233 1939
- 70 McKee C M Rake G and Shaffer, M F Complement fixation test in lymphogranuloma venereum *Proc Soc Exper Biol & Med* 44:410-413 1940
- 71 Mueller, J H and Miller, P A A modification of Rosenthal's chromium sulfite acid method for anaerobic cultures *J Bact* 41:301 303 1941

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27191

PRESENTATION OF CASE

A sixty-one-year-old Jewish merchant entered the hospital complaining of increasing dyspnea and fatigue.

Two years before admission, the patient noticed the onset of increasing fatigue and shortness of breath, and complained of a feeling of pressure over his left chest. Dyspnea gradually increased in severity and appeared with even the slightest exertion or when he was lying on his back or his left side. Only on his right side could he lie comfortably. On two occasions eight months before admission, while lying in bed, the patient brought up a mouthful of bright-red blood without clots. He did not vomit at the time, nor was he coughing. For several months before entry, while hurrying upstairs, he had experienced a sensation of tightness in his neck, accompanied by a dull ache in the region of the antecubital space of the left arm. These symptoms disappeared immediately with rest. In general the patient had felt well, although he was easily fatigued; his appetite was good and there had been no weight loss.

The patient had had scarlet fever at nine years. His mother, father and one brother had died of heart disease.

On examination the patient was well developed and well nourished and in no apparent distress. The chest was barrel-shaped, with flaring of the costal margins and a suggestion of Harrison's groove. The trachea was shifted to the right, as were the borders of cardiac dullness. There were dullness to percussion and diminished breath sounds and tactile and vocal fremitus over the entire left upper-lung field anteriorly, these same signs being present posteriorly on the left down to the level of the second thoracic spine. The heart sounds were distant, but otherwise normal. One examiner found a blood pressure of 180 systolic, 100 diastolic, in the right arm and 155 systolic, 95 diastolic, in the left; this difference was not recorded by others. The abdomen was normal. Examination of the nervous system was negative except for asymmetry of the face, which was believed to be the result of an old Bell's palsy on the left.

The temperature, pulse and respirations were normal.

Examination of the urine was negative, and kidney-function tests were normal. The blood showed a red-cell count of 4,900,000 with a hemoglobin of 15.1 gm. (photoelectric-cell technic), and a white-cell count of 8500. The nonprotein nitrogen of the blood serum was 24 mg, the protein 6.5 gm. per 100 cc.; a blood Hinton reaction was negative. No tubercle bacilli were found in the sputum on three occasions.

An electrocardiogram showed normal rhythm at 70, with a PR interval of 0.2 second; T₁ was inverted, T₄ was very low and triphasic, and there was slight sagging of ST₂.

An x-ray examination of the chest showed a huge oval mass occupying the anterior aspect of the left side of the chest and extending between the anterior ends of the second and sixth ribs. The mass showed calcification at its margin, moved upward with the ribs at inspiration and displaced the heart to the right. The aorta and heart were otherwise normal, and the diaphragm and visible portions of the lungs were also normal. There was no definite evidence of disease in the ribs, although the anterior ends of the third and fourth ribs were indistinct.

An operation was performed three weeks after admission.

DIFFERENTIAL DIAGNOSIS

DR. FREDERICK T. LORD: May we see the x-ray films?

DR. JAMES R. LINGLEY: The films show this very large mass on the left side of the chest. In the lateral view it lies anteriorly, being flattened against the anterior chest wall. In this film with a little more exposure, one can see a thin rim of calcification around the superior margin. The mass is very smooth and sharply defined, and seems to be slightly lobulated in some areas. The aorta appears normal. The heart is displaced to the right but is not appreciably enlarged. The x-ray appearance is more in favor of tumor than of aneurysm, and the presence of calcification in the wall suggests a benign tumor, especially a cyst.

DR. LORD: The shortness of breath on exertion and on lying on the back or the left side, and the sense of pressure over the left side of the chest, suggest encroachment on the thoracic space, with resulting cardiac disturbance.

The tightness in the neck and the dull ache in the left antecubital space may be ascribed to a disturbance in the circulation in the heart muscle, arising either in consequence of encroachment by the mass or as a result of intrinsic disease of the muscle.

The hemoptysis eight months before admission may have been due to congestion from venous pressure or to erosion of the air passages.

The presence or absence of cough is uncertain, and it is desirable to include a definite statement with respect to this symptom. Although the sputum was examined for tubercle bacilli, its character is not described. A statement regarding the presence or absence of wheezing is also lacking.

That the patient was easily fatigued is interesting, but difficult to interpret. That the appetite was unimpaired and the weight maintained is probably significant.

The flaring of the costal margins and the suggestion of Harrison's groove imply that a tug on the diaphragmatic attachments over a long period led to a bending deformity, and that the intrathoracic mass may have been present for a much longer time than the history indicates.

The complex of physical signs is consistent with the presence of a circumscribed collection of fluid or a solid mass without communication with the bronchi. Failure to mention rales leaves us uncertain about their presence or absence.

The trachea and the heart were displaced somewhat to the right. The blood pressure was slightly elevated. There is a question of difference in the level of the blood pressure in the right and the left arm. The facial asymmetry is not to be regarded as Horner's syndrome.

There are no significant blood findings, with the exception of the negative Hinton reaction, which makes aortic aneurysm unlikely.

The abnormal features of the electrocardiogram may be ascribed to one of three possibilities. They might be due to the administration of digitalis (and we should like to know if the patient had had digitalis), to the slight dextrocardia or to myocardial disturbance. Unless digitalis was administered, I am inclined to think that the electrocardiographic findings are secondary to the encroachment on the intrathoracic space by the mass, but I hope we may have the comments of the cardiologists on this matter.

Since a substernal goiter is a possibility, a basal metabolic rate would be of interest, but is probably of no great importance in the absence of other indications of an overactive thyroid gland. An echinococcus fixation test is desirable in such a problem.

With respect to the source of the mass, without cough or wheezing, an origin in the bronchi or lung is improbable, and the absence of pleural fluid seems to exclude the pleura unless it is an encapsulated pleural process. The mediastinum seems the most likely point of origin, and the lo-

cation in the left chest was apparently due to least resistance to enlargement in that direction.

With respect to the nature of the mass, an aneurysm is unlikely because of its apparent lack of connection with the aorta in the x-ray films, in addition to the negative Hinton reaction already mentioned.

Various types of tumor are to be considered. A malignant tumor is unlikely, although an originally nonmalignant process may have become malignant. We are therefore left with nonmalignant tumors. The evidence does not warrant a definite diagnosis, and the best I can do is to enumerate the possibilities. Some reliance may be placed on the relative frequency of different types of tumor as a guide in the chance relation, but I appreciate that the chance relation can be upset by Dr. Mallory's assignments.

Neurofibroma is to be considered, but the site of this tumor in the anterior aspect of the thorax makes it unlikely. Lipoma, thymoma, intrathoracic goiter and echinococcus cyst are possibilities. But of all the possibilities, on the basis of the evidence here and the chance relation, I should lean rather more heavily toward a dermoid cyst. If it is a dermoid cyst, it was present at an unusually advanced age. In Hedblom's* series of 191 cases, only one occurred in a patient between sixty-one and seventy years of age. It is to be remembered, too, that about 10 per cent of these cysts become malignant. A positive diagnosis can be made only by finding such elements as hair, squamous epithelium and sebaceous material.

DR. EDWARD D. CHURCHILL: The problem that was uppermost in our minds in dealing with this patient was the question of advisability of operation. The patient was sixty-one years of age; his mother, father and one brother had died of heart disease. He had changes in the electrocardiogram that were interpreted as not due to the tumor, or displacement of the heart. These changes indicated that the patient might be expected during the course of the coming years to develop clinical manifestations of coronary heart disease. Is that putting it fairly, Dr. Bland?

DR. EDWARD F. BLAND: No digitalis had been given?

DR. CHURCHILL: No.

DR. BLAND: I should say so.

DR. CHURCHILL: This prognosis seemed important relative to operation, because this patient could be expected to continue to complain of precordial pressure in the chest referred down his arm and accompanied by increasing dyspnea. In other

*Hedblom, C. A. Intrathoracic dermoid cysts and teratomata with a report of six personal cases and one hundred and eighty five cases collected from the literature. *J. Thoracic Surg.* 32:2, 47, 1933.

words, we were faced for an indeterminable period with a differential diagnosis between intrinsic coronary disease and symptoms due to this tumor. Again, it seemed to me that in a patient who might be expected to develop myocardial insufficiency any factor that could be a burden on the heart, either mechanically or indirectly through limiting vital capacity, should be removed. The patient would then be in a better situation to face his oncoming coronary disease.

We considered, as Dr. Lord did, that this tumor was benign. However, one possibility that we wanted to exclude definitely was putting this elderly patient through an operation for a tumor that might be malignant and had better be treated by x-ray than surgery. For this reason, needle aspiration biopsy was performed. It was really done as part of the operation. A needle was inserted, and a cloudy, brown fluid withdrawn, which under the microscope showed fat and fatty-acid crystals. This finding, of course, gave a definite preoperative diagnosis of dermoid cyst. If I had encountered a solid tumor, I should have tried to secure enough tissue for microscopic diagnosis, and I should have reconsidered the question of radiation therapy if the tumor proved to be malignant sarcoma or teratoma. After having confirmed the diagnosis, however, we went ahead with the operation.

DR. LORD: I should like to ask Dr. Bland if he thinks he could ascribe the electrocardiographic changes to dextrocardia.

DR. BLAND: No; I am sure you cannot.

DR. TRACY B. MALLORY: Dr. Churchill, do you want to tell us your operative findings?

DR. CHURCHILL: It was a dermoid cyst. We took it out, and the patient recovered.

DR. BLAND: Do you think it might be of interest to repeat the electrocardiogram, just on the chance that the T waves might have been altered?

DR. CHURCHILL: Yes; we shall do so.

CLINICAL DIAGNOSIS

Benign tumor of mediastinum (dermoid cyst ?).

DR. LORD'S DIAGNOSIS

Nonmalignant tumor (dermoid cyst ?).

ANATOMICAL DIAGNOSIS

Dermoid cyst of mediastinum.

PATHOLOGICAL DISCUSSION

DR. MALLORY: Dr. Robert Klopstock studied this cyst with the aid of x-ray films after it had been opened. Most of the calcified material was not an integral part of the wall but merely an

adherent precipitate that could be fairly easily scraped off. A few amorphous masses were embedded in the wall, but there was no organization, and no formation of bony trabeculae as in a teratoma.

DR. CHURCHILL: Dr. Taiana is here from the Argentine. I should like to ask him if that would pass for an echinococcus cyst in the Argentine, where that disease is so prevalent.

DR. JORGE A. TAIANA: If this lesion with calcification were an echinococcus cyst, it would have to be a dead echinococcus cyst. In cases like this we do not find round masses. Usually we find a cavity, more or less clean, with fluid and with hydatid membrane broken into it. The picture here is completely different.

DR. GEORGE W. HOLMES: How much fat was there in the tumor?

DR. MALLORY: Just masses of crystalline fatty acids and cholesterol suspended in the fluid.

A PHYSICIAN: Was the patient completely relieved?

DR. CHURCHILL: He said he was, both physically and mentally.

CASE 27192

PRESENTATION OF CASE

A forty-five-year-old man entered the hospital complaining of exertional dyspnea, cough and weakness.

For the last ten years, the patient had had a morning cough productive of mucoid sputum. Approximately two years before entry, he noticed the onset of shortness of breath on exertion, with a heavy feeling in the chest. His cough grew worse and produced larger quantities of mucoid material, but at no time had it been malodorous or had it contained pus or blood. He consulted his physician, and an x-ray examination of the chest showed bilateral bullous emphysema, with the changes more pronounced on the right, the largest bleb measuring 12 cm. in diameter. He carried on until two months before admission, when the initial symptoms became exaggerated and generalized weakness appeared. An x-ray examination at this time showed the same emphysematous changes, with low diaphragms, but in addition an irregular soft-tissue density in the right paratracheal region, which measured 9 by 8 by 7.5 cm., displaced chiefly the upper lobe and deviated the trachea to the left. Another film nine weeks later demonstrated no change in these findings. The patient stated that during these few weeks before admission he had been given six x-ray treatments, and that coincident with this therapy he had started to vomit, usually in the morning after breakfast and sometimes following

a spasm of coughing. Gradually his generalized weakness increased, and one week before admission a sudden weakness appeared in both legs, which was so severe that he was unable to lift them out of bed. At the time of entry, strength had partially returned in the left leg. During the two months' illness, the patient had suffered from frontal headaches and had lost considerable weight. At twenty he had had gonorrhea, and eight years before admission a right nephrectomy for renal stone. His mother had died from cancer of the uterus.

On examination the patient was pale, weak and cachectic; there was cyanosis and clubbing of the fingers, with an appreciable elevation in the venous pressure. The chest was emphysematous, with slightly less expansion on the right; it was hyperresonant throughout. Scattered rales were heard throughout the chest, most noticeably at the right base. The heart sounds were distant, the blood pressure 108 systolic, 70 diastolic. Abdominal examination was negative except for a right nephrectomy scar. The cranial nerves were normal, but the extremities were wasted and the reflexes on the right side of the body were more active than those on the left. There were ankle clonus and a positive Hoffmann sign on the right; the Babinski signs were normal. Slight but definite motor weakness was present in the right leg and arm (the patient was left-handed), and he performed the heel-to-knee test poorly with his right leg.

The temperature was 101°F., the pulse 100, and the respirations 25.

The urine was normal. The blood showed a red-cell count of 5,080,000 with a hemoglobin of 94 per cent, and a white-cell count of 15,200 with 76 per cent polymorphonuclears. The nonprotein nitrogen of the blood serum was 30 mg. per 100 cc.; a blood Hinton reaction was negative. A lumbar puncture was normal, with a negative spinal-fluid Wassermann reaction. The sputum was negative for tubercle bacilli on one occasion; the stools were normal.

An x-ray film of the chest showed a lobulated mass in the upper anterior mediastinum in close relation to the aorta, but without definite pulsation. No calcification was seen within the mass, and the aorta proximal and distal to it appeared normal. The heart was normal in size and shape. The lungs showed extensive, extremely large, emphysematous bullae, and there was a round 15-cm. shadow in the right anterior lower-lung field. Laminaeograms showed the mass in the upper mediastinum to be almost exclusively on the right side. It was markedly lobulated, and a separate mass was visible posteriorly in the right tracheobronchial angle. A gastrointestinal series showed displac-

ment of the esophagus to the right and posteriorly by the mass in the upper mediastinum. Otherwise there was no evidence of disease in the upper gastrointestinal tract.

The cough increased. Three weeks after admission, the patient began to suffer from transient episodes of acute dyspnea, which lasted but a few minutes and were associated with clonic contractions of the right leg and twitching of the muscles, with jerking of the entire extremity. Gradually the cough became almost constant, and the sputum thick, tenacious and mucopurulent; and one month after admission the right side of the body was completely paralyzed. Finally, a chest plate showed consolidation in the lower portion of the right lung field consistent with pneumonia, and the sputum yielded a Type 20 pneumococcus. The tumor mass had not changed appreciably so far as could be determined. Death occurred six weeks after admission.

DIFFERENTIAL DIAGNOSIS

DR. LOWREY F. DAVENPORT: We have three separate and somewhat unrelated problems here. The patient had extensive pulmonary emphysema, he had a tumor in his chest, and he apparently died of an intercurrent infection due to the pneumococcus. I think we might take up these three points separately and later see if there is any relation among them.

The background and etiology of pulmonary emphysema are obscure in most cases. Obviously, at the time he came into the hospital, the patient had right-sided heart failure, which is curious because in certain types of extensive emphysema there is no evidence of right-sided heart failure. The emphasis seems to lie in the association of certain emphysematous changes in the lungs to secondary sclerosis in the pulmonary artery. When this pulmonary condition does not occur we get very little change in the mechanics of the right side of the heart. If this were primary pulmonary sclerosis with secondary emphysema, the story would have been entirely different, with a long-standing history of cyanosis, the picture of a "black cardiac," or Ayerza's syndrome, which we often speak of and rarely see. I believe we can exclude a primary pulmonary sclerosis as a cause of the emphysema. At the age of forty-five, it certainly is not senile emphysema. We see considerable emphysema associated with long-standing asthma. That is not the case here. It is interesting that the patient had a cough for ten years. At the time he came in he also had clubbed fingers. If we exclude any primary difficulty with the right side of the heart and with the pulmonary circulation, we have to assume that the clubbed fingers were due to the changes going

on in the lung itself. I do not believe that the cardiac history as given here is sufficient to account for the clubbing of the fingers, nor does emphysema itself cause it. With a ten-year cough, assuming that the patient gradually developed emphysema and later developed right-sided heart failure, it seems to me we have to predicate a long-standing infection. If we try to tie up the extensive emphysema with infection, we can do so only by assuming extensive bronchiectasis involving finer bronchioles, so-called "bronchiolar bronchiectasis." The ordinary suppurative type, with a tremendous amount of infection, very quickly gives clubbed fingers, but is not associated with generalized emphysema. The mass in the chest was discovered almost incidentally. In going through the history, I could find no correlating data with which I could tie up the mass in the chest with the emphysema and the right-sided heart involvement.

May we see the x-ray films at this point?

DR. JAMES R. LINGLEY: The films show an extreme degree of emphysema as described, with large blebs and bullae throughout both lungs, the largest being in the apices, where the appearance simulates a pneumothorax. In addition there is this mass projecting to the right from the upper mediastinum. In the lateral view it extends anteriorly. The laminagraph brings out the margins of the mass a little better. It is sharply defined and lobulated, and the aortic arch appears to be pushed a little to the left side and may be a little dilated in the region of the arch.

DR. DAVENPORT: How intimate was its relation to the aorta?

DR. LINGLEY: Certainly it was in contact with the aorta.

DR. DAVENPORT: We have here an unquestionable tumor in the chest, with very meager definitive data to arrive at the diagnosis. There are several things that may be helpful in trying to untangle the nature of this mass. I think, in general, we believe that a lobulated mass in that region is usually lymphoma, and the obvious signs, which I should interpret as cerebral manifestations, also fit in very well with this diagnosis. However, the lack of response to x-ray therapy is decidedly against it. If it was not lymphoma, what other type of tumor could it have been? I think we must assume that in a man of forty-five the coincidental cerebral symptoms prove it to have been a malignant tumor. On statistical grounds, the diagnosis lies, then, between a cancer and a lymphoma. The shape of the mass is rather against cancer. Bronchiogenic carcinoma should give signs of obstruction. Cancer close to the hilus of the lung, usually does, and only those situated in the periphery, chiefly the adenocarci-

nomas, would grow to this size without giving clinical and x-ray signs of atelectasis.

The blood findings are somewhat against a cancer that had reached the stage of metastasis. This man came in with a red-cell count of 5,800,000. In our experience, about half the patients with cancer of the lung show a secondary anemia by the time they present themselves for diagnosis. We have to be careful of one thing in this case: the patient may have had a moderate amount of polycythemia on the basis of pulmonary changes and right-sided heart changes, so that for him a hemoglobin of 94 per cent and a red-cell count of 5,000,000 might have represented a drop. Unfortunately, we have no data to support that. In spite of the fact that this tumor did not respond to six lymphoma doses of x-ray therapy, I consider lymphoma the most likely possibility.

There is little to say about the terminal course. The patient had bouts of dyspnea, which do not fit in very well with right-sided heart failure and the changes going on in the lung parenchyma. Perhaps they were cerebral in origin. I think it is also true, if he had metastasis to the brain, that any anoxia of the brain might precipitate convulsions. As a matter of fact, in epilepsy we make use of overbreathing experiments and various types of provoked dyspnea to bring out irritability in the brain.

Having drawn this picture of a man who slowly developed emphysema on the basis of changes in the bronchi and repeated infection, who had what I shall call a malignant lymphoma in the chest and who died of terminal pneumonia and evidence of brain metastases, are there any loopholes in this diagnosis? Is there anything we should go back and try to tie up? He had a nephrectomy eight years prior to admission for renal stone. It does not seem likely that he could have had a hypernephroma at that time that could have been missed.

DR. TRACY B. MALLORY: Are there any suggestions?

DR. EDWARD F. BLAND: I should like to raise some objection to the emphasis placed on right-sided heart failure on the evidence given in this record. It seems to me that the only thing that makes one suspect that the heart might have been involved is that the patient had pulmonary disease of some sort for a long time. The second point is the swelling of the veins in the neck. There are conditions other than right heart failure that give full veins in the neck, for example, mediastinal obstruction. It might have been helpful if something had been said about pulsations in the veins in the neck, because usually there is an absence of pulsations if the swollen veins are the result of mediastinal obstruction in contrast to pul-

sating swollen veins due to back pressure from right-sided heart failure. It is a little unusual to get serious failure of the right side of the heart without some enlargement or dilatation of the heart detectable by physical examination or by x-ray study, and in the films the heart certainly does not look enlarged to me.

DR. GEORGE W. HOLMES: I was going to point out the same thing that Dr. Bland has: that the heart is small and there is no evidence of right-sided enlargement.

DR. BLAND: Another point is that the liver was not felt, and I think we must assume that it was not enlarged. No mention is made of edema, and I doubt therefore if right-sided heart failure was an important feature of the illness, even though at postmortem the right ventricle may be found thicker than normal (cor pulmonale).

May I ask Dr. Davenport or Dr. Churchill about this question of pulsating veins in the neck? Is that a reliable differential point between back pressure due to mechanical obstruction as opposed to heart failure?

DR. EDWARD D. CHURCHILL: I should have expected a rise in venous pressure with emphysema from the reduced negative intrathoracic pressure.

DR. RALPH ADAMS: It seems to me that that lateral view shows atelectasis of a part of the upper lobe, and I should suggest that it is a primary bronchiogenic carcinoma arising in the upper lobe. If that suggestion should prove to be correct, one might explain the signs in the neck by secondary pressure on the vena cava.

DR. CHURCHILL: How common are intracranial metastases of lymphoma?

DR. MALLORY: They are not at all common, but are not extremely rare.

DR. CHURCHILL: As a focal lesion?

DR. MALLORY: Viets and Hunter* a few years ago reported five cases of cerebral lymphoma with focal lesions. In leukemia it is commoner to have infiltration without focal signs.

DR. CHURCHILL: The patient had a little nodule in the lung opposite the one affected. The so-called "primary tumor," in addition to the brain manifestations, speaks very strongly for cancer, it seems to me.

DR. HOLMES: Why do you drop aneurysm without any comment? I am not saying that I think it is an aneurysm, but I wonder how you rule it out so easily.

DR. DAVENPORT: I think we are forced to rely on you. I assumed, when Dr. Lingley said that the mass was attached to the aorta but was not a part of it, that aneurysm could be excluded. I should not be willing to accept that information from a film not combined with fluoroscopy.

DR. LINGLEY: The mass is rather lobulated, too.

DR. ADAMS: Is it uncommon in the experience of the X-ray Department to see a mass that size in one part of the mediastinum and so little in all the rest?

DR. HOLMES: I should say so.

CLINICAL DIAGNOSIS

Carcinoma of lung, primary and metastatic.

DR. DAVENPORT'S DIAGNOSES

Malignant lymphoma of mediastinum and brain.

Pulmonary emphysema.

Right-sided heart failure.

ANATOMICAL DIAGNOSES

Bronchiogenic carcinoma, with mediastinal and cerebral metastases.

Pulmonary emphysema.

Bronchopneumonia.

Cor pulmonale.

PATHOLOGICAL DISCUSSION

DR. MALLORY: The post-mortem examination showed very extensive emphysema, with large bullae running up to 5 and 10 cm. in diameter. There was a tumor that filled the upper anterior mediastinum and surrounded the great vessels, causing, I am sure, significant venous stasis by mechanical pressure in the thoracic inlet. There was also a tumor in the central portion of the right upper lobe, the appearance of which was characteristic of a primary bronchiogenic carcinoma. It had invaded the pulmonary artery to that lobe, which was nearly occluded by a combination of tumor and secondary thrombus. So far as the rest of the lung was concerned, Dr. Davenport correctly prophesied an extensive terminal bronchopneumonia. There was no marked pulmonary fibrosis, and the appearances were those of idiopathic emphysema, with nothing to give one any lead as to its cause. We did not particularly note bronchiectasis, but I am not prepared to say that it was not there. A bronchiectasis of the smaller radicals is sometimes hard to differentiate from emphysema, and the picture was further obscured by the pneumonic consolidation. The smaller branches of the pulmonary artery showed no sclerotic changes. The right ventricle measured 7 mm., which is quite definite evidence of cor pulmonale, since the heart as a whole was not hypertrophied. A single metastasis, about 2 cm. in diameter, was found in the upper portion of the motor cortex on the left. No metastases were found elsewhere in the body. Microscopically the tumor was a highly undifferentiated carcinoma, probably squamous cell in type.

*Viets H. R. and Hunter, F. T. Lymphoblastomatous involvement of the nervous system. *Arch. Neurol. & Psychiat.* 29:1246 1926, 1933.

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of
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SUBSCRIPTION TERMS: \$6.00 per year in advance, postage paid, for the United States; Canada, \$7.04 per year, Boston funds; \$8.52 per year for all foreign countries belonging to the Postal Union.

MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

DOCTORS FOR BRITAIN

THE American Red Cross has issued an appeal for 1000 American physicians to serve with the British Red Cross in caring for military and civilian war casualties. Volunteers accepted by the British Red Cross will serve either as medical officers with the Royal Army Medical Corps or as physicians with the Emergency Medical Service, a civilian organization under the direction of the Ministry of Health. In addition to the endorsement of the leading professional groups in this country, this appeal has the approval of the Secretary of War, the Surgeon General of the Public Health Service and the President of the United States.

The task of treating civilian casualties, of providing medical care in the large factories and in

the expanded navy, army and air corps, and of dealing with the manifold problems incident to wholesale bombing of cities, particularly in preventing epidemics, has proved insurmountable for the medical profession in England. The call for volunteers merits the quick and eager response of American physicians.

The need is urgent, the dangers many, and the rewards almost unlimited. Service with the British Red Cross offers a rare professional experience in the medical technics of modern warfare. Even more important, however, is the opportunity of helping not only soldiers in combat but also those on the other firing line of defense: the population of the ruined cities of the British Isles.

THE FRANCIS AMORY PRIZE

NEARLY thirty years ago there died in Beverly an elderly gentleman, Mr. Francis Amory, after a long illness complicated by the miseries of prostaticism. His will bequeathed in trust to the American Academy of Arts and Sciences the sum of \$25,000, to be allowed to accumulate for twenty-one years, after which the income was to be devoted to a prize to be awarded once in every seven years for the purpose of encouraging and rewarding those engaged in studying, perfecting and publishing methods for the relief of diseases that he described as, "diseases and derangements of the human sexual generative organs in general, and more especially for the cure, prevention or relief of the retention of urine, cystitis, prostatitis and so forth." The testator also suggested that the award may be made to the discoverer of "any notably useful remedy," or to the inventor of "any cunning device or instrument," or if such a person fails to appear, to the writer of "any exceptionally meritorious treatise" on these subjects.

The Academy accepted the trust, and for the first time the income has become available for distribution in the current year. As is so often the case in such bequests, the terms imposed by the testator have been quite difficult to carry out in such a way as to observe their conditions, to do justice to all possible candidates for the prize,

and to promote the public interest. The provision that the work to be recognized must have been done during the seven-year period just preceding the award, and the question whether it is permissible to consider important scientific research the connection of which with the advances described by the testator as the object of his generosity is somewhat remote and indirect, have been the chief perplexities. A committee of the Academy, under the chairmanship of Dr. Roger I. Lee, after long inquiry and deliberation, and with the aid of legal advice when necessary for interpretation of the will, has divided the award among four candidates: Dr. Hugh Young, professor of urology, Johns Hopkins University School of Medicine; Dr. Joseph F. McCarthy, director, Department of Urology, New York Polyclinic Medical School and Hospital; Dr. Carl R. Moore, professor of zoology, University of Chicago; and a European scientist whose name is withheld at present, because he is a citizen of one of the victim states of the Reich, and there is reason to believe that the award would be confiscated or harm be done him by his amiable *Gauleiter*. The accomplishments of Dr. Young, Dr. McCarthy and Dr. Moore that justify the honor to be conferred on them are known to all students of the functions and diseases of the urogenital organs.

The award is to be made at a meeting of the American Academy of Arts and Sciences to be held on the evening of Wednesday, May 14, at 8:15 at 28 Newbury Street, Boston. All interested physicians are invited to attend.

MEDICAL EPONYM

BUNDLE OF HIS

The original description of this structure, by Wilhelm His, Jr. (b. 1863), is found in the article "Die Thätigkeit des embryonalen Herzens und deren Bedeutung für die Lehre von der Herzbeugung beim Erwachsenen [The Activity of the Embryonal Heart and Its Significance in the Theory of the Contraction of the Adult Heart]," which appeared in *Arbeiten aus der medizinische Klinik zu Leipzig* (14-49, 1893). A portion of the translation follows:

After prolonged investigation, I have succeeded in finding a muscular bundle that connects the auricular and the ventricular septums. This has hitherto escaped observation because, on account of its small dimensions, it is visible in its entire extent only if this area is cut lengthwise. Up to the present time, I have been able to trace the course of the bundle in such sections and also in serial sections in a grown mouse, a newborn dog, two newborn infants and one adult (thirty years) human being. The bundle arises from the posterior wall of the right auricle near the auricular septum in the atrioventricular groove, continues along the upper margin of the ventricular septum with frequent interlacing of the muscle fibers of the two structures, and then runs forward until, near the aorta, it forks, dividing into a right and left branch. . . .

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

ANNUAL MEETING OF THE COUNCIL

The annual meeting of the Council will be held in the Swiss Room of The Copley-Plaza, Boston, on Wednesday, May 21, 1941, at 10:30 o'clock.

Business:

1. Presentation of record of special meeting held April 9, 1941, as published in the *New England Journal of Medicine* for May 8, 1941.
2. Nominating Committee retires to deliberate.
3. Reports of standing and special committees.
4. Election of officers and orator.
5. Appointment of committees for ensuing year, both standing and special.
6. Incidental business.

ROBERT N. NYE, *Secretary pro tempore*.

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

DEATH ASSOCIATED WITH INFECTION AND STILLBIRTH

A thirty-five-year-old multipara arrived at the hospital in active labor at term with a temperature of 103.6°F. She had never been examined during this pregnancy, and had had no prenatal

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

care whatsoever. The past history was essentially noncontributory. The patient had three living children, but more specific information concerning the labor and delivery in these pregnancies was not obtained. There was no history of previous medical complications.

Physical examination on entrance was essentially negative. There was no evidence of anything abnormal in the lungs; no mention was made of the throat. The heart was rapid, with a rate of 120, but there was no mention of a complicating disease. The uterus was enlarged to a size consistent with full-term pregnancy, the membranes had ruptured, apparently shortly before admission, and the patient was in active labor. After ten hours and forty minutes, the patient was delivered normally of a stillborn child. Death occurred twenty hours after delivery.

Comment. This is a most unusual story. There was nothing in the history to explain the infection that must have been present, and unfortunately, permission for an autopsy was not obtained. In the absence of evidence of pneumonia, — which, if present, would undoubtedly have been recognized, — it seems likely that the patient was suffering from a generalized infection, possibly streptococcal in origin. Obviously, cultures of the blood and lochia should have been made.

The stillbirth was probably due to the fever, but early intrauterine sepsis is a possibility. Since this maternal death occurred in 1937, before the advent of chemotherapy, one cannot judge what the outcome would have been if the patient had been treated with one of the sulfonamides.

APPLICANT FOR FELLOWSHIP

Owing to an error, the following name was omitted from the list of applicants for fellowship printed in the April 10 issue of the *Journal*.

PLYMOUTH DISTRICT

Bernard H. Beuthner, 24 School Street, Middleboro.
University of Breslau, 1925.

Ralph C. McLeod, *Secretary*.

DEATHS

HOLT—**CHARLES H. HOLT, M.D.**, of Pawtucket, Rhode Island, died April 26. He was in his sixty-first year.

Born in Bradford, England, Dr. Holt attended Brown University and received his degree from the Harvard Medical School in 1906. He was president of the Rhode Island Medical Society, and was a fellow of the American Medical Association and a former member of the Massachusetts Medical Society.

His widow, two sisters and a son survive him.

WELLES—**DELBERT A. WELLES, M.D.**, of Fitchburg, died May 1. He was in his seventy-eighth year.

Born in Concord, New Hampshire, he attended Thetford Academy, Vermont, and received his degree from George Washington University School of Medicine in 1898. He trained in government hospitals for six years before going to Fitchburg. He had been a city councillor since 1939.

He was a fellow of the Massachusetts Medical Society and the American Medical Association.

MISCELLANY

NOTES

On May 5, Dr. Walter B. Cannon, George Higginson Professor of Physiology, Harvard Medical School, was presented the Friedenwald Medal of the National Gastroenterological Association. This was the first award of the medal, and the accompanying citation read, "In recognition of his pioneer utilization of the x-rays in gastroenterology, and his important contributions to the mechanics of digestion, to the elucidation of the sensations of hunger and thirst, and to the development of the science and practice of gastroenterology."

The two awards of \$100 each offered by the Laymen's League Against Epilepsy in 1940 for the best original unpublished observations or investigations bearing on the subject of epilepsy have been granted as follows: for work done in a state epileptic colony or mental hospital, to Dr. Walter L. Bruetsch, Central State Hospital, Indianapolis, Indiana, "Rheumatic Epilepsy"; for work done elsewhere, to Dr. Frederick A. Fender, Stanford University Hospital, San Francisco, "Convulsions Following Remote Electrical Stimulation of Subcortical Cerebral Levels."

At a meeting of the Trustees of Middlesex University, held on April 12, the following new trustees were appointed: Stanley R. Latshaw, Haddam, Connecticut; Alton L. Miller, Brookline; Joseph F. O'Connell, Boston; Charles J. O'Malley, Boston; and Samuel H. Wragg, Needham Heights, Massachusetts.

CORRESPONDENCE

"TEN-DAY PAPER" FOR ADMISSION TO STATE MENTAL HOSPITALS

To the Editor: It seems advisable to call to the attention of the medical profession the basic provision and intent of Section 79, Chapter 123, General Laws, which is the authorizing statute for a temporary-care, so-called "ten-day paper," admission of a patient to a mental hospital within this commonwealth.

This statute provides in part that the superintendent of a hospital for the insane may, upon request of certain designated persons, receive as a patient for a period not exceeding ten days a person who is "in need of immediate care and treatment because of mental derangement other than drunkenness."

There appears to be a general impression that this type of admission is primarily a *ten-day observation*. Scrutiny of the statute does not support this view. It is intended to provide an *emergency admission* for the patient who must be hospitalized immediately, and who should not await usual commitment proceedings before admission for reasons of his own personal welfare or the safety of the public.

Other sections of Chapter 123 provide for observation in a mental hospital. Section 77 authorizes the usual thirty-day observation, Section 100 includes observation for those under complaint or indictment, Sections 103 and 104 allow observation for those under sentence for crime.

It is therefore recommended that the use of the ten day paper be restricted to those cases in which the patient is in need of immediate care and treatment because of mental derangement other than drunkenness.

CLIFTON T PERKINS, MD, *Commissioner*
Department of Mental Health

100 Nashua Street
Boston

MEDICAL OFFICER WANTED FOR THE SCHOOLSHIP NANTUCKET

To the Editor The Massachusetts Nautical School is desirous of securing the services of a medical officer for the Schoolship *Nantucket* for the summer cruise of 1941 the itinerary of which covers 8245 miles, ending in Boston on September 9.

The medical officer of the *Nantucket* will have charge of safeguarding the health of 85 cadets, and of the officers and crew, numbering about 30. It is important to have a man not only of good professional ability but of the highest character.

W K QUEEN, *Commander*

100 Nashua Street
Boston

REPORTS OF MEETINGS

BOSTON ORTHOPEDIC CLUB

There was a regular meeting of the Boston Orthopedic Club at the Boston Medical Library on January 20 with Dr Augustus Thorndike, Jr, presiding.

The first paper was by Dr A B Ferguson and was entitled 'Wedging Round Back of Adolescence'. This condition has been described under various titles, including vertebral epiphysitis and Schuermann's disease. It is characterized by gradual development of anterior wedging of one or more of the dorsal vertebral bodies during adolescence and is a common condition. The patient with a wedging round back has poor posture, with round shoulders and exaggeration of the posterior curve of the dorsal spine, the anterior cervical and lumbar curves are increased, and the abdomen may be protuberant. Fatigue is the commonest symptom before and during adolescence, but later rigidity of the spine may reduce fatigue. Pain is not common in those who are quite young but is frequent at and after the age of seven years, when osteoarthritic changes may be evident.

In a group of these cases studied for possible etiologic factors it was found that the condition was not confined to a particular type of person, that debilitating disease may favor its development, that the frequency of such conditions as coxa plana and Osgood-Schlatter's disease was not sufficient to suggest an etiologic relation, and that familial tendencies may favor its development, although obviously, the condition is not wholly congenital. Dorsal round back may be noted clinically, but the diagnosis of wedging round back of adolescence is usually a roentgenographic problem because it is necessary to rule out by roentgen examination certain other causes of round back or kyphosis, such as fracture hemivertebra, incomplete segmentation, malacia, chondrodysplasia,

rheumatoid arthritis and specific infectious diseases. The features of this condition are progressive multiple anterior rounded wedging of the dorsal vertebral bodies. The wedging may progress indefinitely, but there is rarely much increase after the age of twenty. During adolescence irregularity of the intervertebral disks and apophyseal plates may be evident, and at or after the age of seventeen osteoarthritic calcareous lipping may be present. The vertebral bodies do not become ankylosed, nor do they present areas of destruction or abscess formation.

Since immobilization in plaster has failed to prevent the progress of the deformity and the presence of pain, weakness and fatigue, it was considered likely that inflammation, which should be benefited by such a regimen, is not the etiologic factor in wedging round back of adolescence. From a consideration of the development of the vertebral column and a review of the progress of cases in which x-ray films taken before adolescence were available, Dr Ferguson concluded that in certain persons a persistence of a vascular area at the middle of the vertebrae anteriorly weakens the structure and results in compression where the stress is greatest—in the dorsal region. It was emphasized that the wedging occurs by compression at the middle of the anterior surface of the body, not by compression of the upper or lower surfaces. The apophyseal plates appear later roentgenographically and the irregularity found in this condition was considered a secondary phenomenon resulting like the later osteoarthritic lipping, from impaired nutrition. In this conception, there is no need to assume the presence of disease in the vertebral body or elsewhere. It is simply that all people do not have spines entirely suited to the erect posture.

The treatment indicated for the prevention of deformity, fatigue and pain should be reduction of stress on the front portion of the vertebral bodies in the dorsal area. This treatment can be very simply accomplished by means of a postural brace, a modification of an ordinary short spinal brace. The usual horizontal bars at the buttocks and vertical bars along the spine are retained, but at the upper extremity of the vertical bars a padded metal block is placed. The height of the brace is such that the pad impinges on the back immediately below the area of the round back deformity. The brace does not itself support the dorsal spine, but maintains a lumbar posture that excites active extension of the dorsal spine. The brace is not effective for older patients, when the spine is not flexible, the adolescent period of rapid growth having been passed.

Treatment of wedging round back of adolescence at the New York Orthopedic Hospital has been mainly along conservative lines. Nearly all the patients had exercises to strengthen muscles and keep the spine mobile. In a few cases, a short spine brace, such as that described above, was used and in others the spine was fused surgically in the deformed area, with or without an attempt to correct the deformity. Treatment by exercises did not prevent increase of deformity or the development of ache or fatigue. The results of surgical fusions were not, on the whole, an improvement over the results obtained by exercises. Fusion of the area of greatest deformity did not prevent progress or maintain correction of the deformity except in a few cases, nor was there a demonstrable favorable effect on the tendency to increasing pain and fatigue with advancing age. Nevertheless some patients with distressing fatigue and pain were much better after spine fusion, and such treatment may be of

sential in such cases. As a rule, if deformity did not increase in the fused area, it did increase in the areas adjacent to the fusion, and it seems that one could not expect to prevent increase of deformity in the adolescent unless the entire dorsal spine were fused; however, there seems to be no justification for extensive surgery in the treatment of such a mild condition. Use of the brace definitely tended to inhibit the progress of deformity and the development of symptoms in adolescent and preadolescent patients. When ache or fatigue is marked the patient is apt to be too old to derive benefit from the brace. If the spine has become too stiff to straighten definitely when the brace is applied, it is too late to derive benefit from the brace. Wedging round back of adolescence should be diagnosed in the preadolescent years, when the simple treatment by postural brace may prevent the development of troublesome deformity.

During the discussion, Dr. John J. Kuhns suggested that the roentgenographic appearance of a persistent vascular canal may be an artefact. In 1000 autopsies at the Children's Hospital, with many clinical diagnoses of wedging round back, no pathologic changes were found. Furthermore, not all adults with a persistent canal have evidence of past or present wedging round back. Treatment should be carried out early, but Dr. Kuhns finds that many patients need elaborate jackets rather than simple back braces, which probably are effective only where there is a well-developed postural reflex.

Dr. Joseph Barr, of the Massachusetts General Hospital, agreed that there was an interference of epiphyseal growth rather than an epiphysitis. He believes that the presence of tight lower extremities may cause an increased lumbar lordosis and a functional kyphosis. As for treatment, it is found that exercises help materially even when roentgenographic evidence does not confirm the improvement.

In answer, Dr. Ferguson replied that the x-ray evidence undoubtedly is not artefact. He suggested that those patients with roentgenographic evidence but no clinical disease have minimal vascular impairment or good musculature and posture, whereas persistence of the vascular canal in the lumbar region causes no symptoms because of the absence of stress. In regard to the hip flexion mentioned by Dr. Barr, it was stated that this is usually present in the older patients, and therefore is more probably a secondary phenomenon.

The second paper, "A Recently Defined Destructive Lesion of Bone," was presented from the clinical aspect by Dr. William T. Green and from the pathological by Dr. Sidney Farber. The authors reported the occurrence of destructive lesions in the bones of 10 children, all under twelve years of age, studied at the Children's Hospital during the last ten years. The disease process was limited almost completely to the destructive lesions in the skeletal system. These lesions were either single or multiple and involved mainly the flat bones, particularly the skull, ribs and pelvis. They were seen in many other bones, but never at the distal ends of extremities. When single, the lesions had the roentgenographic characteristics of solitary bone cysts. The multiple lesions could be compared most accurately in distribution and punched-out appearance with either myeloma or metastatic cancer. More than twenty-six areas of involvement of the skeleton were noted in one patient. The presenting sign was usually swelling or pain. Swelling was more prominent than pain when the skull was involved. Healing occurred readily under roentgen-ray therapy. Nine of the 10 patients were apparently well when examined recently. One patient died outside the hospital; the details cannot be obtained.

Biopsy specimens were obtained from all the lesions. The microscopic picture varied considerably, but in general it was essentially a granulomatous process in which eosinophilic infiltration was frequently a prominent feature. Activity of the marrow cells in the involved areas was evident in several cases to such an extent that a picture characteristic of myelocytic myeloma was suggested by the initial studies. Various gradations from the purely granulomatous reaction to a definite xanthomatous process could be demonstrated in various sections examined. Small to large amounts of lipids, stainable by the Scharlach R method, were present in the lesion.

The lesion clinically and microscopically conforms to a picture recently described under the name "solitary granuloma of bone" or "eosinophilic granuloma of bone." A comparison of the pathologic material obtained from these 10 patients with the bone and visceral lesions found in Schüller-Christian's disease and with pathologic specimens from the lungs, lymph nodes and skin of a condition that has come to be known in recent years as Letterer-Siwe's disease has led to the conclusion that all three conditions represent variations of the same basic disease process. Preliminary bacteriologic and animal-inoculation studies have thus far been negative in the group under discussion, as well as in Schüller-Christian's disease and Letterer-Siwe's variation of that disease. Further studies of the etiologic basis for the benign destructive lesion under discussion, as well as of the other variants of the Schüller-Christian syndrome, are under way. There appears to be no justification, on the basis of this experience, for considering eosinophilic or solitary granuloma of bone as either a new or a separate disease entity.

HARVARD MEDICAL SOCIETY

A regular meeting of the Harvard Medical Society was held at the Peter Bent Brigham Hospital on January 28, with Dr. Elliott C. Cutler presiding.

The first case was that of a sixty-nine-year-old man who entered the hospital because of intense jaundice and itching. For four months he had noticed weight loss and increasing lassitude and fatigue. Three weeks before admission he had been troubled with constipation and crampy right lower-quadrant pain. Anorexia had been present for two weeks, jaundice for five days and nausea for one day. There was no previous history of right upper-quadrant pain or other gall-bladder complaints. Physical examination revealed a chronically ill, emaciated, jaundiced man in no distress. The abdomen was tender in the right upper quadrant; the liver edge could be palpated 2 cm. below the right costal margin, and was round, firm and nontender. Laboratory data revealed normal red-cell and white-cell counts, a +++ test for bile in the urine, an icteric index that rose from 50 to over 100, a blood diastase positive at 1:68 and normal plasma-protein levels and liver function tests. Roentgenograms demonstrated an extrinsic mass deforming the duodenum. The probable diagnosis of pancreatic neoplasm was made, but Dr. Merrill C. Sosman stated that such a diagnosis could not be made from x-ray studies alone, for tumors cannot be seen until they are very large, and may well be cysts instead of neoplasm.

The second case was that of a sixty-nine-year-old man who entered the hospital because of anorexia of one month's duration. His stools had become increasingly lighter and his urine darker, and two weeks before admission his friends had noticed that he was jaundiced. He had had some vague chest pains, which radiated to

right side, and there had been an indefinite weight loss. Physical examination revealed a well developed, emaciated and jaundiced elderly man. There was an apical stolic murmur without any cardiac enlargement. The abdomen was large, and without any tenderness or masses. The liver descended 3 cm below the costal margin, and its edge was smooth and firm. There was a rect inguinal hernia on the left side. The icteric index was 60, and the bleeding and clotting time normal. A ray study was negative. The patient was operated on, and cholecystogastrostomy carried out, with subsequent decrease of symptoms of jaundice, improvement in the color of the stools and urine, and a drop in the icteric index to 30. Dr Sosman stated that here again no preoperative diagnosis was possible, but that postoperatively roentgenograms there was no increase of the gall bladder induration and no regurgitation of barium into the gall bladder. Dr Cutler pointed out that the usual type of anastomosis may allow infection to ascend into the liver, and this has led to the valvular type of anastomosis employed by Dr Zollinger. In this patient, the patient had been anesthetized to allow full and painless respiration immediately after operation.

The paper of the evening was 'Carcinoma of the pancreas' delivered by Dr Frank Glenn, of Cornell University Medical College. As an introduction the speaker pointed out that this disease annually causes most as many deaths as pulmonary cancer. Pathologically, cancer usually appears in the head (70 per cent). Association with biliary disease is not constant, and nodules may be diffuse or scattered. Metastases to regional lymph nodes are found in 90 per cent of cases. In the liver in over 50 per cent, there are peritoneal implants in less than half the cases, and skeletal spread is present in 20 or 30 per cent. Microscopically there may be a cylindrical adenocarcinoma from the duct system that tends to be cystic, a tumor with large granular cells similar to those of the alveoli, or an islet-cell carcinoma. The incidence of the condition was found to be 1 in 12 hospital admissions. The chief complaint was pain in 68 per cent of patients, jaundice in 50 per cent and occasionally other symptoms. The high incidence of pain was emphasized, and it was noted that there is apt to be more itching from this type of jaundice than from that of a common-duct stone. The leading symptom as loss of weight (97 per cent). On physical examination jaundice was found in 68, hepatomegaly in 53 abdominal tenderness in 37 and a palpable gall bladder in only 34 per cent of the cases. In regard to laboratory findings, blood counts were found to be variable, stools were found to contain blood in over half the cases, but no other data were considered significant. The importance of guaiac positive stools as evidence of intestinal invasion was suggested. Roentgenograms were carried out in the majority of cases and were reported negative in 50 per cent. Of the remaining half, defects were noted in the pylorus and all portions of the duodenum, with diagnosis of probable carcinoma of the stomach, duodenal ulcer and carcinoma of the head of the pancreas in equal numbers. The duration of life after the onset of signs and symptoms was found to average only slightly over nine months.

Treatment was variable and discouraging. Palliative operations apparently relieved the biliary obstruction decreased the itching and increased the appetite. The occurrence of cholangitis was discouragingly frequent, the mortality was high, and the duration of life was not increased. Curative operations, which attempt to extirpate the tumor, have been found technically difficult and

there is the added disadvantage that the patients do poorly postoperatively, probably owing to the inadequacy of attempted substitutes for the external pancreatic secretions. Dr Glenn considers the external secretions important for maintaining proper pancreatic and hepatic functions, for ligations of the ducts in dogs lead to fibrosis and decrease of active pancreatic tissue and an early and marked increase in the liver fat. He proposes to preserve the secretions by transplanting the duct containing pancreas to the posterior stomach wall. In animals, the pancreas has been found grossly and microscopically normal while the patency of the ducts is maintained and the liver remains normal. Dr Glenn therefore advocated removal of the tumor bearing area and transplantation of the remaining ducts to the posterior stomach wall. Of 3 possible cases operated on, 2 of the patients have shown too much induration around the head of the pancreas at the second stage, whereas the third was found to have cancer at the ampulla of Vater. It was therefore suggested that one-stage operations might be advisable. One important feature of this type of operation is the impossibility of any ascending infection.

In conclusion Dr Glenn suggested that the hope for the future lies in earlier diagnosis and in improved and more radical surgery. The important clues for earlier diagnosis are abdominal pain, loss of weight and jaundice without any other definite cause. Improvement in treatment should include earlier and more frequent exploratory operations.

The discussion was opened by Dr David Cheever, who pointed out that the pancreas should be considered in both the acute (pancreatitis) and the chronic (carcinoma of the head of the pancreas) surgical abdomen. He has found in the latter condition that although pain is common, it is not similar to that of biliary colic. Instead, it is usually vague and persistent, and radiates toward the back or left flank. Roentgenographic studies are of questionable value, even when the tumor is in the head, and entirely miss those in other parts of the gland. Cases have usually seemed inoperable, owing to seeding of the peritoneum, especially in the right upper quadrant. Dr Cheever believes that cholecystogastrostomy offers the most favorable prognosis at present, for it usually affords a year and a half of fairly comfortable existence, often followed by sudden death.

Dr S. J. Thannhauser stated that diagnosis can be facilitated by the use of the double-barrel duodenal tube and the secretin test. He is of the opinion that the findings of 80 to 90 milliequivalents of alkali per liter following secretin is significant. He has found that pain below the left costal margin may simulate that of cardiac origin. He stated that in his opinion choline is not related to the fatty metabolism of the liver in man. He has had no good results with the feeding of raw pancreas.

Dr J. E. Dunphy has also found the incidence of pain to be about 68 per cent, but he differentiates the site of the lesion by the character and site of the pain. Obstruction of the ducts by a small tumor is apt to produce colicky pain, which diminishes as the disease progresses; in other cases, there is an ache in the back, with vague abdominal pain, which is worse at night and when the patient is recumbent, large tumors of the body of the pancreas may affect the celiac plexus and cause excruciating pain, which may radiate even to the chest.

Dr Sosman stressed the importance of diagnosis by exclusion, for loss of weight in 97 per cent of cases indicates that failure to lose weight can fairly well rule out

this condition. The possibility of relieving pain by irradiation in inoperable cases was advanced.

The meeting was closed by Dr. Glenn, who suggested that not only the alkalinity but also the volume following the use of secretin is significant. He has found irradiation therapy inefficacious in allaying pain. He has observed glycosuria intermittently in 14 per cent of his preoperative patients, whereas Opie has found evidence of true diabetes in 10 per cent of such cases at autopsy.

NOTICES

FRANCIS AMORY AWARDS

Members of the medical profession are invited to attend a meeting at the American Academy of Arts and Sciences, 28 Newbury Street, Boston, on May 14, at 8:15 p.m., for the occasion of the presentation of the Francis Amory Awards to three investigators for their notable contributions to the treatment and cure of diseases and derangements of the genitourinary organs.

The investigators are Dr. Joseph F. McCarthy, professor of urology and director of the Department of Urology, New York Polyclinic Medical School and Hospital; Dr. Carl R. Moore, professor of zoology, University of Chicago; and Dr. Hugh H. Young, professor of urology, Johns Hopkins University School of Medicine.

Each recipient will briefly describe his investigations, placing special emphasis on the circumstances leading to the culmination of the work for which the prize is given.

TRUDEAU SOCIETY OF BOSTON

The annual meeting of the Trudeau Society of Boston will be held at the Belmont Hospital, Worcester, Massachusetts, on Thursday, May 15, at 4 p.m.

PROGRAM

Pulmonary Tuberculosis and Pregnancy. Dr. Arthur D. Ward.

Discussion by Drs. Samuel C. Gwynne, Francis D. Hart and Frederick L. Good.

Carcinoma of Lung and Tuberculosis. Dr. Marguerite D. Shepard.

Discussion by Drs. Ernest L. Hunt and Ralph H. Adams.

Rectal Fistula in the Tuberculous. Dr. Percy A. Brooke.

Discussion by Dr. Andrew Taylor, of Hartford, Connecticut.

Treatment of Guinea Pig Tuberculosis with a New Chemical Compound. Drs. Raymond H. Goodale and Leslie A. MacClintock.

Gomenol Therapy in Pulmonary Tuberculosis: Presentation of cases. Dr. Robert H. Baker.

Discussion by Drs. Donald King and Nahum R. Pillsbury.

SOUTH END MEDICAL CLUB

The next regular meeting of the South End Medical Club will be held at the headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston,

on Tuesday, May 20, at 12 m. Dr. Henry Jackson, Jr., will speak on "Certain Practical Aspects of Blood Disorders as Seen by the General Practitioner."

Physicians are cordially invited to attend.

BOSTON DISPENSARY

There will be a clinical staff meeting of the Boston Dispensary in the Pratt Hospital Auditorium on Friday, May 16, at 12:30 p.m. Dr. Burrill B. Crohn, chief, Gastrointestinal Service, and associate in medicine, Mt. Sinai Hospital, New York City, will speak on "Sprue versus Ileojejunitis." Luncheon will be served at 12 m.

All interested members of the profession are cordially invited to attend.

1941 GRADUATE FORTNIGHT

The 1941 Graduate Fortnight of the New York Academy of Medicine will be held from October 13 to 24. The purpose of this meeting is to make a complete study and authoritative presentation of a subject of outstanding importance in the practice of medicine and surgery. The current topic is "Cardiovascular Diseases, including Hypertension."

There will be a carefully integrated program that will include morning panel discussions, afternoon clinics and clinical demonstrations at hospitals of New York City, evening addresses and a scientific exhibit. The evening sessions at the Academy will be addressed by recognized authorities from leading medical centers of the United States and Canada. The comprehensive exhibit will include books and roentgenograms, pathological and research material, and demonstrations of clinical, laboratory and therapeutic methods.

The following subjects will be included: basic hemodynamic principles essential to the interpretation of cardiovascular disorders; heart failure; diagnosis and treatment of coronary insufficiency; pathology of arteriosclerosis, with special reference to coronary arteries; observations on social significance and recent advances in the treatment of arteriosclerosis; advances in the knowledge of endocarditis, with special reference to the therapy of subacute bacterial endocarditis; neurocirculatory asthenia and related problems in military medicine; syphilis of the cardiovascular system; arrhythmias, including paroxysmal tachycardia and their treatment; the value and limitations of the electrocardiogram in medical practice; evaluation of drugs used in the treatment of cardiovascular diseases; surgery of the heart and large vessels; surgical treatment of peripheral embolism and peripheral aneurysm; thrombophlebitis; the use of heparin; Raynaud's disease; thromboangiitis obliterans; experimental studies related to shock; influence of extrinsic factors on the coronary flow and the clinical course of heart disease; treatment of heart disease in childhood; management of heart disease in pregnancy; mechanism of essential hypertension; mechanism and treatment of pulmonary edema; rheumatic heart disease; and effects of renal excretory products of hypertension.

The Academy provides this program for the fundamental purpose of postgraduate medical education; consequently all members of the medical profession are eligible for registration. A complete program and registration blank may be secured by addressing: Dr. Mahlon Ashford, New York Academy of Medicine, 2 East 103d Street, New York City.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, MAY 11

MONDAY MAY 12

American Association for the Study of Goiter Hotel Statler, Boston
12-15-15 p.m. Clinicopathological conference Peter Bent Brigham
Hospital 200 Huntington Ave.

TUESDAY MAY 13

American Association for the Study of Goiter Hotel Statler Boston
9-10 a.m. Subacute Bacterial Endocarditis with Special Reference
to Treatment Dr J M Faulkner Joseph H Pratt Diagnostic
Hospital
12-15-15 p.m. Clinicorontogenologic conference Peter Bent Brigham
Hospital amphitheater

WEDNESDAY MAY 14

American Association for the Study of Goiter Hotel Statler Boston
9-10 a.m. Hospital case presentation Dr S J Thannhauser Joseph
H Pratt Diagnostic Hospital
12 m. Clinicopathological conference Children's Hospital
15 p.m. Francis Amory Awards American Academy of Arts and
Sciences 28 Newbury Street Boston

THURSDAY MAY 15

9-10 a.m. Some of the Effects of Flying on the Cardiovascular Sys-
tem Dr Atherton Graybiel Joseph H Pratt Diagnostic Hospital
15 p.m. Diagnosis and Management of Large Bowel Lesions Dr
Richard Cattell United States Naval Hospital Chelsea

FRIDAY MAY 16

9-10 a.m. Early Diagnosis of Carcinoma of the Stomach Dr B B
Crohn Joseph H Pratt Diagnostic Hospital
12-30 p.m. Sprue versus Heterosporus Dr Burnell B Crohn Boston
Dispensary

SATURDAY MAY 17

9-10 a.m. Hospital case presentation Dr S J Thannhauser Joseph
H Pratt Diagnostic Hospital

*Open to the medical profession

MAY 11—Boston Doctors Symphony Orchestra Second annual concert
see 790 issue of May 1

MAY 12-14—American Association for the Study of Goiter Page 753
see of April 24

MAY 13-16—National Gastroenterological Association Page 791 issue
of May 1

MAY 14—New England Obstetrical and Gynecological Society Page 757
see of April 24

MAY 15—Trustees Society of Boston Page 834

MAY 20—South End Medical Club Page 834

MAY 21—Massachusetts Medical Legal Society Page 785 issue of May 1

MAY 21-22—Massachusetts Medical Society, Boston Page 781 issue of
May 1

MAY 28-JUNE 2—American Board of Obstetrics and Gynecology Page
62 issue of February 6

MAY 29-31—Medical Library Association Page 671 issue of April 10

MAY 30-31—American Heart Association Hotel Statler Cleveland

MAY 30-JUNE 2—American College of Chest Physicians Hotel Statler
Cleveland

JUNE 2—American Medical Golfing Association Page 785 issue of
May 1

JUNE 2-6—American Medical Association Cleveland

JUNE 2-6—Women's Auxiliary American Medical Association Hotel
Statler Cleveland

JUNE 4—Harvard Medical Alumni Association Page 790 issue of May 1

JUNE 22-24—Maine Medical Association Marshall House York Harbor
Maine

OCTOBER 13-24—1941 Graduate Forthright of the New York Academy of
Medicine Page 834

OCTOBER 14-17—American Public Health Association Page 579 issue
of March 27

DISTRICT MEDICAL SOCIETIES

SSEX SOUTH

MAY 14—Relation of the Doctor to the Law Mr Leland Powers New
Hampshire House Swampscott

FRANKLIN

MAY 13—This meeting will be held at 11 a.m. at the Franklin County
Hospital Greenfield

MIDDLESEX SOUTH

MAY 14—Page 752 issue of April 24

BOOKS RECEIVED

The receipt of the following books is acknowl-
edged, and this listing must be regarded as a suf-
ficient return for the courtesy of the sender. Books
that appear to be of particular interest will be re-
viewed as space permits. Additional information
in regard to all listed books will be gladly
furnished on request.

*Chest X-Ray Interpretation, with Special Reference to
Tuberculosis* By J Burns Amberson, Jr, MD 8", pp
per, 48 pp, with 30 illustrations New York National
Tuberculosis Association, 1941

*Popular Home Remedies and Superstitions of the Penn-
sylvania Germans* By A Monroe Aurand, Jr Foreword
by Logan Clendening, MD 8", paper, 32 pp Harris-
burg, Pennsylvania The Aurand Press, 1941. 25c

Emergency Surgery By Hamilton Bailey, FRCS (Eng),
surgeon, Royal Northern Hospital, London, surgeon and
urologist, Essex County Council, surgeon, Italian Hospi-
tal, consulting surgeon, Clifton Hospital and the County
Hospital, Chatham, and external examiner in surgery,
University of Bristol Fourth edition 8", cloth, 944 pp,
with 930 illustrations Baltimore Williams and Wilkins
Company, 1940 \$15 00

The Therapeutics of Internal Diseases Vol III Super-
vising editor George Blumer, MD, David P. Smith
Clinical Professor of Medicine, Yale University School of
Medicine, and consulting physician to the New Haven
Hospital Associate editor Albert J Sullivan, MD,
adjunct clinical professor of medicine, George Washing-
ton and Georgetown medical schools, and chief medical
officer, Gallinger Municipal Hospital, Washington, D C
8", cloth, 738 pp, with 1 chart, 39 illustrations and 2 ta-
bles New York D Appleton Century Company, Incor-
porated, 1941 Sold only as a set \$40 00

Schizophrenia in Childhood By Charles Bradley, MD,
medical director, Emma Pendleton Bradley Home, East
Providence, Rhode Island 8", cloth, 152 pp New York.
The Macmillan Company, 1941. \$2 50

Modern Drugs in General Practice By Ethel Browning,
MD 8", cloth, 236 pp Baltimore Williams and Wil-
kins Company, 1940 \$3 00

Malignant Disease and Its Treatment by Radium By Stan-
ford Cade, FRCS, surgeon, Westminster Hospital,
Mount Vernon Hospital and the Radium Institute, lec-
turer in surgery, Westminster Hospital Medical School,
and associate examiner in surgery, University of London
4", cloth, 1280 pp, with 623 illustrations, many in color
Baltimore Williams and Wilkins Company, 1940 \$18 00

Biological Symposia Vol I *The Cell Theory Mating
types and their interactions in the ciliate infusoria, chro-
mosome structure* Edited by Jaques Cattell With a fore-
word by Albert F Blakeslee, PhD 4", cloth, 238 pp,
with 39 illustrations and 19 tables Lancaster, Pennsylv-
ania The Jaques Cattell Press, 1940 \$2 50

Biological Symposia Vol II *Speciation Defense mech-
anisms in plants and animals, biological basis of social
problems, regeneration* Edited by Jaques Cattell, with a
foreword by George A Baitsell, PhD 8", cloth, 270 pp,
with 13 illustrations and 1 table Lancaster, Pennsylvania
The Jaques Cattell Press, 1941 \$2 50

BOOK REVIEWS

The Management of Obstetric Difficulties. By Paul Titus, M.D. Second edition. 8°, cloth, 968 pp., with 368 illustrations and 5 color plates. St. Louis: The C. V. Mosby Company, 1940. \$10.00.

The title *The Management of Obstetric Difficulties* is hardly broad enough to include all the valuable material presented in this volume. For instance, the first two chapters are devoted to the treatment of sterility, including a well-illustrated discussion of the treatment of absolute sterility in the male.

The section on the complications of pregnancy contains many valuable features, including a detailed discussion of the so-called "minor complications" and the treatment of various systemic diseases and conditions requiring surgery during pregnancy. The important subject of infections of the urinary tract is well covered.

The methods of diagnosis and treatment in cases of ante-partum hemorrhage are by no means standardized, and naturally not everyone will agree with the author's opinions. He does not mention the latest advances in soft-tissue roentgenography in the diagnosis of placenta previa; he favors cesarean section in cases of complete separation of the placenta, in spite of recent statistics that show a lower mortality following normal delivery.

Two chapters deal with the toxemias of early and late pregnancy, and this subject is particularly well covered by the author, who has devoted much study to it.

Complications of labor, obstetric operations and complications of the puerperium are considered in detail. The author is conservative with regard to the use of pituitary extract in the first stage of labor, to the point of withholding it, even in small doses, in patients who are suffering from uterine inertia. Emphasis is properly placed on strict asepsis in connection with all obstetric surgical procedures, and all the operations are described in minute detail.

Two chapters are devoted to the care of the newborn infant, and the last four chapters deal with the actual preparation for delivery and aftercare of the patient, including a discussion of the various types of obstetric anesthesia and analgesia, and concluding with a description of the technic of preparation and injection of dextrose solution and of blood transfusion. Here, again, the subjects, although interesting and useful, do not seem to belong in a book devoted to obstetric difficulties.

Because of its attention to detail, this book is particularly useful when an unusual complication is encountered; it is to be recommended for ready reference.

A Review of the Psychoneuroses at Stockbridge. By Gaylord P. Coon, M.D., and Alice F. Raymond, A.B. 8°, cloth, 299 pp., with 66 tables and 2 figures. Stockbridge, Massachusetts: Austen Riggs Foundation, Incorporated, 1940. \$2.00.

From the standpoint of psychotherapeutics, this is an excellent book. It gives in detail and very cogently the technic used at Stockbridge and the results obtained. Whatever statistical evaluation is made of the results, however, is to a certain extent impaired by the fact that the patients are a highly selected group: first, financially, and secondly, by reason of their background of training and experience. In other words, the segment of psychoneurotics under consideration is probably far more accessible to the treatment described in this book than any other conceivable group of sufferers from neuroses.

One might easily criticize the classification of the types discussed in the first part of the book. When the seven groups are viewed objectively, it is found that practically every conceivable type of personality develops neurosis, since the classification goes all the way from the group of "overly ambitious, conscientious, dynamic, energetic persons" in Group A to the "immature, dreamy, romantic persons" of Group E, and includes all the way-stations of personality in between. To attribute a neurosis to hard, driving work without enjoyment and then to find that people of opposite temperament develop exactly the same symptoms cancels the classification of causes or of pertinent factors that are probably nonrelevant.

The reviewer still believes that the cause of the neurosis is unknown. One can postulate, in the present state of knowledge, that emotional stress, maladjustment in life, trouble or trauma—physical or mental—precipitates symptoms. But the essential basis is still a matter for future research to uncover. Adding inconclusive factor to inconclusive factor, no matter how many times, does not bring conclusiveness. Nor does the comparison of results of the Stockbridge cases with those of other institutes seem very convincing. The Stockbridge sample includes only neurasthenia or anxiety states, whereas that of the New York Psychiatric Institute, for example, includes compulsion neuroses as well, probably patients extremely unfortunate in all the circumstances of life, and also those having severer neuroses, that is, those leading to commitment or at least care in a hospital for mental disease. This at once excludes the minor cases.

Despite these criticisms, the book is, on the whole, excellent. It is clear, frank and intelligent in its discussion of the neuroses. The concluding section, which deals with mental hygiene and maladaptation, is excellent and is recommended to the general practitioner as well as to the psychiatrist. The book does credit to the institute from which it emanates.

Landmarks and Surface Markings of the Human Body. By L. Bathe Rawling, M.B., B.Sch. (Cantab.), F.R.C.S. Eighth edition. 8°, cloth, 98 pp., with 36 illustrations. New York: Paul B. Hoeber, Incorporated, 1940. \$3.00.

This little volume offers a handy reference to the surface topography of anatomic structures. Although such treatises are of special interest to surgeons, internists will be interested in the data on the viscera of the cranium, thorax and abdomen, particularly since they relate to physical diagnosis.

The terminology of this eighth edition is revised to conform to the standard B.N.A. nomenclature.

Synopsis of Materia Medica, Toxicology and Pharmacology: For students and practitioners of medicine. By Forrest Ramon Davison, B.A., M.Sc., Ph.D. 12°, cloth, 633 pp., with 45 illustrations. St. Louis: C. V. Mosby Company, 1940. \$5.00.

This book is a well-organized epitome of the subjects mentioned in the title. The first portion is devoted to general principles, and is followed by a description of drugs acting on the various systems, the metals and, finally, the biologicals. Despite its apparent conciseness, a great deal of ground is covered. The small type militates against any sustained reading, and hence lessens its value as a text. For quick reference it should prove very useful.

The New England Journal of Medicine

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VOLUME 224

MAY 15, 1941

NUMBER 20

MEDICAL ETHICS*

A Gay Lecture on a Serious Topic

DAVID CHEEVER, M.D.†

BOSTON

IN THESE grim days when the press and the very air bring us news of heart-rending brutality, cruelty and the violation of every moral and ethical principle, it would be an agreeable interlude if even for a moment you could listen to a witty and frivolous talk, but it is probable that all of you have guessed that the adjective in my title is in reality the name of the donor of this foundation—a man decidedly as little gay in personality as he was frivolous in attitude toward his profession. Ethics is defined as the doctrine that treats of the nature and grounds of moral obligation and the rules that ought to determine conduct in accordance with it—the science of right conduct and character. The best way to show you an example would be to transport you on a magic carpet to the world of fifty or sixty years ago and introduce you to Dr. Gay, so that you might walk the wards with him, see him with his patients in office, hospital or home, or listen to him in court or at a legislative hearing. Would that I could paint a picture of him!

George Washington Gay was born in New Hampshire in 1842 of what I like to consider aristocratic lineage—that is, he was the descendant of an English yeoman who came to Massachusetts Bay in 1630. His parents were farmer-folk; he had only a country school education. Perhaps he wished to be a doctor because he had watched the fatal illness of a well-loved sister. After his father's death, he apprenticed himself to a local physician to earn a little money, borrowed more, and went to the Harvard Medical School. Undoubtedly in 1864 he "walked the wards," as the expression was, of the Boston City Hospital in the year of its foundation; he became one of its earliest surgical house officers and was at once

appointed to the newly established Out-Patient Department—thus beginning a lifetime service. With intelligence, courage and an accurate knowledge of anatomy, and inspired by the dawn of the Golden Age of Medicine, he became an accomplished surgeon. He ligated successfully the subclavian, innominate and common carotid arteries, which is testimony to his prowess appropriate to those times. He lectured on surgery, and his students have not forgotten such terse epigrams as: "Every sprain of the wrist is a Colles fracture, every contusion of the hip is a fracture of the neck of the femur, until proved otherwise."

Having no children, perhaps Dr. Gay was the more completely absorbed in promoting the happiness and success of his students and colleagues. Little that was good which needed encouragement—little that was wrong which needed correction—escaped him. As he played a part and later watched the actors on the medical stage, he saw with regret that some of them violated certain moral obligations and rules of conduct pertaining thereto, and thus worked harm to the reputation of the profession and to those who practiced it. And still mindful of the happiness of physicians, he noted their ineptness in business matters and the frequency with which old age, overtaking them after a lifetime of work, found them with but inadequate financial security for their declining years. He therefore created here a lectureship, hoping thus to help them understand these things that were outside their purely professional education. And so it happens to be my privilege to try to carry out a part at least of my old friend and teacher's wish. We might dismiss the matter with the inevitable trite but true statement that behaving like gentlemen and observing the Golden Rule would prevent all ethical blunders. Most of us, however, need a more explicit warning of the pitfalls and perplexities that lurk in the peculiar

*A George W. Gay Lecture on Medical Ethics, presented at the Harvard Medical School, February 13, 1941.

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situations created by the practice of medicine, a fact that has been recognized since Hammurabi, emperor of Babylonia, through the School of Hippocratic physicians, down to the present time. Most organized bodies of physicians have promulgated codes of ethics: that of the American Medical Association, printed as a booklet for distribution, is quite long and explicit, whereas that of the Massachusetts Medical Society deals in its three hundred words with the broadest general principles. Inevitably the manners and social attitudes of the physician are related to the ethical customs, which in turn are interwoven with important problems inherent in the art as distinguished from the science of medicine. These things cannot be taught; the human soil in which flourish the instincts and principles of right conduct was bequeathed to you by your forebears and cultivated at your mother's knee and by your father's side through the years of infancy, childhood and adolescence; if it is not fruitful it is too late now to alter its chemistry, but the vines that spring from it may still be cultivated and the tares uprooted.

It is convenient and conventional to think of the relations of the physician in three categories,—with his patients, with his fellow physicians and with society at large,—yet evidently these are closely related. Mention of them, however, helps a little to clarify an inquiry.

Medicine is certainly a learned, and is usually spoken of as a liberal profession, meaning by liberal, a profession controlled by no narrow doctrine, but receptive to any true advance from any source, whose professors share with each other and with the world their discoveries and methods without thought of deriving from them exclusive personal profit. Thus there is a fairly clear distinction between such a profession and a commercial business or trade, although this has become less clear since business has been touched with the magic of academic edict as "the newest of the professions," and medicine has been commercialized by some of those who practice it. Nevertheless, it is not unreasonable to think of business as primarily concerned with making a profit from its transactions, and of a liberal profession as primarily concerned with rendering service to society, with personal profit as a means to an end rather than the chief objective.

Thus, "a spirit of competition considered honorable in purely business transactions cannot exist among physicians without diminishing their usefulness and lowering the dignity of the profes-

sion." Such competition is I think in two ways: directly by effecting self the practice of others, and advertizing.

Thus is raised the question of proprietorship a physician has vice versa. Formerly, when the rule and specialism the communities were smaller and socially, the physician had his patient attended from birth to death and mutual loyalty. Medical science was one doctor was likely to know as another, and the relief of the patient was owing as much to understanding and confidence by the actual application of scientific adays the advent of specialism question in the patient's mind is the right man to treat the complaint. We all know that is a dispensable way in which science has been advanced; we also know particular problems in some field and solved by special study, and when perfected, many of these patients confidently returned to the general practitioner. If disadvantage overemphasis on specialism, it is the fault of the medical profession partially educated in medical journalism to a point where and without a corresponding acquisition and common sense, demand experience of my own will illustrate the contraction of the fast well known but uncommon when the deformity causes happened that the relief of the extensive, radical dissection gave much better results than operations, interested me and satisfactory results, on the few my way in hospital and private less these palms were exhibited in my community, for on more than with complaints within my family especially abdominal surgery commend a surgeon, and when their condition was one that I operate on, I was greeted by a rejoinder: "Why, I thought you were in hands and crooked fingers to make a living on Dupuytren's

Let us try to be specific about this matter of the proprietorship of patients. It is fundamental that a patient has an inalienable right to consult any physician he chooses, with that physician's consent. Any ethical customs that seem to deny this are based merely on principles of courtesy, consideration for the feelings of others and the real advantage of the patient himself. Clearly, if a doctor has, for years been the trusted adviser of a family group, and has thus become familiar with the physical, nervous and mental reactions of its members, he is likely to be able to treat their illnesses with especial skill and sympathetic understanding. Clearly, if a doctor is in actual charge of a continuing illness, the sudden substitution of another physician will interrupt continuity of treatment and lose the advantages of personal knowledge of the earlier phases of the disease. Moreover, it is inevitable that were a doctor subject to dismissal at the caprice of his patient, he could not possibly feel the interest that springs from loyalty and a realization of appreciated service. Thus we can understand the medical ethic which decrees that "except in case of pressing emergency a physician should not consent to take charge of the patient of another physician," and in case he does so, should return him at the earliest opportunity. What, then, becomes of the inalienable right before alluded to? Simply this: the physician called to take charge of the patient of a brother practitioner should insist that the patient himself notify the other doctor of his dismissal, he would be wise also to have, if possible, a friendly talk with him by telephone or in person.

The laity often complain that they are estopped by medical ethics from having the physicians whom they want. As will be seen from what I have just said, all that doctors ask is courteous treatment and the assumption by the patient himself of full responsibility. The best solution of the patient's desire to have other advice is the consultation. Every physician worthy of the name should welcome a consultation with another authority whom he respects; he has a right to refuse to call a man who does not meet this requirement. The conscientious doctor will always ask for a consultation if he is in doubt about the plan and course of treatment, he will be wise if he also does so whenever he detects a wavering of confidence on the part of the patient or his family. I consider it wishful thinking to say that the asking for a consultation by a physician may not plant doubt and anxiety in the patient's mind, but it need not do so if he is a person of sense who sees in it the act of a broadminded physician who will leave no stone unturned to combat his disease. Much depends, of course, on the

tact and attitude of the consultant, whose suggestions must not connote criticism of what has been done; it is perfectly possible to change a diagnosis and prescribe a different course of treatment if the matter is approached with tact and consideration for the feelings of all concerned. Sometimes, however, it is inevitable that the patient—or more probably his friends—will insist that the consultant take over the care of the case. Positively, this may not be done without the full consent of the attendant, practically, it is best that it be avoided, if possible. Perhaps the dilemma may be solved by an agreement to see the patient again at suitable intervals without the formality attending a first consultation; sometimes it has been thought best to agree on another physician to take charge. Everything must be done, consistent with the patient's welfare, to prevent the conscientious physician who is willing to call a consultant from thereby losing his patient.

Let us return to a comparison of the customs of a liberal profession and a commercial business, especially in the matter of advertising. It is not necessary to invoke the authority of the late P. T. Barnum, supershowman, as to the secret of his success, to prove that advertising will bring material reward, but it needs no argument to prove that a liberal and learned profession would lose its dignity and repute if it adopted such methods. Advertising makes its appeal through the senses to the emotions by methods of persuasion, exaggeration and overstatement sometimes bordering on deception. The time-honored viewpoint of the leaders of our profession that a physician should be advertised among the laity only by the inevitable spreading of good reports about him by his satisfied patients, and among his colleagues by his participation in medical meetings and his contributions to medical periodicals, which give a perfectly proper account of what he is interested in and what he is doing, is still sound. The grosser forms of publicity need not be enumerated. Professional cards should be sent only to colleagues and bona fide patients and published only in medical journals, an exception being the custom of placing a card with name, address and specialty in newspapers of cities with large foreign-born population to help those who are handicapped by language difficulties in finding a doctor. No circular or statement descriptive of a physician's methods or achievements should be published or circulated. Of late years the daily press has succeeded in creating and whetting in the public an insatiable appetite for medical news, and boards of health, educational institutions and private groups have adopted as their duty the education of the people in medical matters. In this com-

petition for acceptable news to fill their columns, the papers report medical lectures, publish excerpts from medical periodicals and importune physicians to grant interviews and write articles on purely medical topics. It cannot be denied that if Dr. John Doe, of 10 Harley Street, who is a specialist in cardiology, gives a popular lecture on heart disease before some fraternal association and their ladies, which is reported in the morning paper, he will have secured a most effective advertisement at the expense of his more conservative and less vocal colleagues. To inform the public properly in regard to health matters, without undesirable publicity for the physician, is a delicate matter. Such material should be supplied by medical columnists who are not practitioners, or by the secretary or a committee of a medical society, or at least under the aegis of an educational institution. It is an age of publicity: you probably cannot keep out of the newspapers but you can discourage and refuse to have a part in anything that through its quality as an advertisement tends to give you an advantage over your colleagues.

One subject in connection with ethics that seems scarcely worth discussing among gentlemen is the inviolability of the confidential relation between patient and doctor. The physician on occasion may have to inquire about the most intimate matters,—the patient may have to bare his soul, if his ills are to be helped. The revealing of such things to a third party almost inevitably leads to the dissemination of gossip, false rumors, notoriety and unhappiness, and if traced to its source, destroys the confidence of the patient in his physician. Such situations are more apt to arise in small communities where people are well known to each other than in urban practice. Two exceptions to the obligation of professional reticence exist: in a Massachusetts court of law there is no such thing as a privileged communication, and a doctor may be subpoenaed and required to tell the facts in his possession; the second exception is in connection with communicable diseases in which silence may jeopardize the public health or the health and happiness of an innocent person. A simple statement to the patient of your plain duty in the matter will convince him that he must adjust it, or allow you to, in the way best for the public interest.

No question on the fringe of medical ethics is more troublesome than the remuneration of physicians. There is no accepted scale of fees, the nearest being the fee tables agreed upon by some local medical society for local application only, and hortatory rather than obligatory on its mem-

bers. There was once a Boston Medical Society, which issued such a table, now long obsolete. Actually at one extreme stands the old-fashioned family doctor in the country, whose fame is sung in fiction, biography and poetry; who sent no bills, kept no books, collected a little cash but a great many commodities on which he and his family lived. His expenses were very small. How much he influenced the course of the diseases which he treated is problematical, but when he died the whole countryside mourned his passing. At the other extreme stands the surgical specialist who may charge what the traffic will bear. Our local code says that "with the understanding and consent of their patients beforehand, physicians may place any value upon their services deemed proper."

But who shall decide what is to be "deemed proper"? There is no regulating body, the nearest approach being the various types of sickness insurance and group medicine schemes that are springing up over the country. The lay public sometimes protest that they cannot understand the necessity for the sliding scale that generally obtains under our free institutions, but the explanation is simple enough. On the one hand the physician, being a liberal-minded man practicing an altruistic profession, is traditionally glad to donate his services to the poor, to lessen his charges to those of small means; to make full charges only to those who can pay them without being crippled thereby. It was a tradition in old New England that a doctor should expect and plan that at least two fifths of his work was likely to be unremunerative. On the other hand the physician has a right to expect to earn a decent living; he has spent the best years of his life and many thousands of dollars in preparing himself; his earning power amounts to little before he is thirty; if in city practice, he is likely to find himself shelved by an age-retirement hospital ordinance at sixty-three, and there is always the intervening threat of coronary occlusion. Moreover, his overhead expenses for office and instruments of precision for diagnosis or therapeutics are vastly greater than his father's were. To support his family and provide for old-age security on the precarious collection of small fees certainly demands great industry and good health, and justifies the charging of generous sums in appropriate cases. And who can say what a physician's services are worth? Apologists for huge fees say that there is no limit to the value of the successful conduct of a case of lobar pneumonia, or for saving a life or for making it tolerable by a surgical operation. No doubt a millionaire would agree that he would give nine tenths of his fortune if it were necessary to save his life, but

the point is that it is not necessary, since there are probably dozens, scores or hundreds of other physicians available who could render the same service. An infinite number of workers, some conspicuous and some humble, daily do work on the skillful performance of which depend the lives of countless citizens: the engineer, the engine driver, the mechanic who repairs the steering gear. It is impossible to compute the dollar value of human life and use it in determining fees.

What is the objection to charging fees if they may be collected? One reason is, of course, that the fee may be a financial burden that makes the doctor's services more of a misfortune than a blessing. A second is that it may become the subject of dissatisfaction, remonstrance or even litigation, which destroys the mutual confidence between physician and patient, and the gratitude of the latter toward him who should be his benefactor. A third is that the report of a large fee imposed travels far and wide, like any sensational bit of news, and creates in the public at large the conviction that doctors are overpaid, mercenary persons whose services are not within the reach of people of moderate means. Thus are the public turned toward free clinics. A peculiarly unlovely form of overcharge might be called "raiding the estate." Some physicians, if their patient has died, seem to consider that so long as the deceased has no further use for his property, it is proper to make a large charge to be paid by the executors, whereas in fact those formerly dependent on the deceased may find themselves seriously embarrassed by the loss of his earning power. But the chief argument against huge fees is a spiritual one: the degradation of the physician's ideal from that of service to that of selfish personal advantage.

I recommend a simple way of dealing with this question, namely, the direct approach, which ought not to be criticized on the ground of poor taste or lack of dignity, because the freeing of the patient so far as possible from financial worry is often an important factor in his recovery. Except when the patient and his resources and attitudes are well known to you, ask him frankly if he would like to discuss the probable cost of your services. If he says there is no need, well and good, but nine times out of ten he will welcome the suggestion. Then name a suitable maximum charge, which you consider your services to be worth, and say that you are accustomed to scale down your charges in case of need to a certain irreducible minimum, which you are justified in maintaining, because if it is not worth your while to work below that figure, the patient's needs may be

provided for by referring him to a younger but fully competent man or, if necessary, to a free clinic. Often it may be acceptable to calculate with him the total cost of his illness, including hospital care, nursing and incidentals, and on occasions I have promised that the total cost shall not exceed a certain sum, with the implication that my fee would be proportionately less in case other expenses were unexpectedly large. These methods in my experience have brought satisfaction and a minimum of disputes. The plan adopted by some busy doctors, or especially by highly organized clinics, of having professional charges entirely arranged by a paid fiscal agent seems open to objection on the ground that it cannot be a satisfactory substitute for the sensitive perceptions of a conscientious physician; it is enough to remind you that the cashier is primarily a business person.

Here it is appropriate to say a word about collecting the money you have earned. If cash is offered, you had better accept it. For most services you will send a bill at a convenient time, or on the first of the month, or quarterly. It should be itemized in a broad way,—the inclusive dates, the number of visits, the special services,—so that the patient will know what he is asked to pay for. If monthly or quarterly reminders and a personal letter or two are ignored, you must decide whether to let the matter drop or to employ a collecting agency or your own lawyer: If an agency, you must satisfy yourself that the methods it proposes to employ have your approval. The threat of legal action is implied in any measures taken by an agency, and although a letter from an agency or lawyer may be sufficient, it is only too likely that further steps—attaching a patient's property or a lawsuit—may be advised. I strongly advise against either of these measures; although justified by rules of strict justice, they tend to identify the rendering of medical service with the sale of goods, they inevitably lead to the permanent loss of your patient, to the spreading of ill reports about your mercenary attitude, and not infrequently to the filing of a countersuit for malpractice by an angered and dissatisfied patient. But once in my life have I threatened suit for payment, and that was when I was virtually accused of homicide by the frenzied parents of a child whose attack of acute appendicitis they had neglected; I recovered a small fee, which was poor compensation for my expenditure of nervous energy, and I could not be sure that the parents' moral outlook had been helped.

In connection with what has been said about the fallacy that a physician has a proprietary interest in his patients, it should be added that, con-

trary to an opinion widely held among the laity, you are under no legal obligation to undertake the care of a patient. In a pressing emergency there is, of course, a compelling moral obligation to respond, and a case once undertaken may not be relinquished until it is placed in other competent hands. If you are called, especially at night, by a person unknown to you, to a distant locality, it is well to act with caution; a good expedient is to recommend that a local physician in the neighborhood be called, and say that you will respond if he finds it necessary to ask for your assistance—for this purpose make it a practice to know the names of reliable doctors in the various sections of your city. If you go without this precaution, leave your watch and wallet at home. There is another aspect of night calls, however: there seems to be a tendency among some practitioners to shirk the tiresome and onerous things. Not long ago one of those rarely fortunate men who lived at a period and in a locality that permitted him to do general practice and cultivate a specialty as a hobby told me that he was called at night by a lady whose family he had formerly attended for many years, who apologized for calling him to come to see her grandchild, who seemed acutely ill. "But my dear Mrs. Blank," he said, "you know I am eighty-three years of age, and that some time ago I turned you over to my young friend, Dr. John Doe. Why do you not call him?" "I have just done so," she replied, "and he said that he does not go out nights." The old doctor assured her that either he or Dr. Doe would be over as soon as possible, and it is scarcely necessary to say that a telephone call from the older to the younger practitioner brought relief to Mrs. Blank's anxieties.

It is surely sound ethics that everybody who applies to you as a sufferer seeking relief must be enabled to obtain that relief. I have tried to make it a point of honor to see that anyone who came to me for advice and whom, for one reason or another, I could not handle should be definitely placed in the hands of a competent colleague or recommended to an appropriate clinic—such reference being accomplished and assured, if possible, by personal communication, and the patient being told to let me know if he is still at a loss.

A problem that has always plagued doctors and about which there is some difference of opinion is our attitude toward the quasi-medical cults. It is safe to say that there always have been and always will be those who profess to heal the ills of mankind by methods based on a mistaken all-inclusive doctrine rather than under the guidance of scientific knowledge. Much as we pity those unfortun-

ates who are the victims of these cultists, it is a mistake to castigate, scorn or hold the latter up to ridicule, since experience shows that this avails but little except to excite the suspicion of intolerance, jealousy and the existence of a "medical trust." This is especially true, of course, in cults founded on religious belief, in which criticism may profoundly wound the spiritual nature of those who profess them. But there is another side. If we subscribe to the doctrines so well expressed in our code that "physicians should encourage sound medical learning and uphold in the community correct views of the powers and limitations of the science and art of medicine, and should clearly maintain the distinction between legitimate medicine and quackery," it is difficult to see how we can honorably consult with a cultist over a medical problem. A consultation implies a common basis of belief. Would it be profitable for a scientific physicist to confer about a subject in his field with a man who believes that the earth is a flat disk? And yet there is said to be much consulting between regular physicians and cultists, which cannot fail, it seems, to dignify and strengthen the cultists in the eyes of the laity. "But," you will ask, "are not the interests of the patient paramount, and can I not help him by consulting with his cultist adviser?" Certainly his interests as a sick man are paramount, and your consultation may help him, though under the circumstances, not with certainty. The way out of the dilemma that I suggest is to agree to the consultation on the condition that you be permitted to explain to the patient that you do not subscribe to his adviser's doctrines and fear that your reliance on medical science will not be acceptable to him. If the patient and his friends are anxious enough, they will insist on having you, but your reputation among the other group as a desirable consultant is not likely to grow.

When my crusading spirit was stronger than it is now, I sometimes tried to bring a lost sheep back into the fold, always with disappointing results. On one occasion I was consulted by a lady who some months previously had discovered a small lump in the breast. According to her story she consulted a practitioner of a cult employing manipulative therapy, who stated that he found an abnormal condition of the fourth dorsal vertebra at the same horizontal plane as the breast lesion, for which it was undoubtedly responsible. Three times a week for some months he manipulated the spine, and at the end of each visit he did something to the breast lesion that I was given to understand by him was not rubbing or massage but something involving very special skill because

it was done with the heel of the hand. When I examined the patient, there was presented a still small primary tumor showing every characteristic of a carcinoma, but the striking thing was the presence of involved nodes in the axilla and a number of small metastatic lesions in the skin surrounding the tumor—something that I have not seen before or since in so early a case and that must have been due apparently to the manipulation. A radical extirpation with skin graft was done, with the inevitable sequel some years later. I found it hard to believe that this practitioner would not be aghast when brought to full realization of what he was doing. In a friendly and conciliatory spirit I invited him to witness the operation; he did not appear. I then invited him to come to the laboratory where the fresh specimen was being preserved so that it might be demonstrated to him by Dr. Wolbach. In answer he wrote a letter saying, among other things, that he guessed that if Dr. Cheever had cured without mortality by operation as many fibroid tumors of the uterus as he had by his special manipulation of the spine, he would not have such an ill idea of the methods of the cult. Feeling that this man was a menace to society, I brought the facts to the attention of the authorities, who, after a hearing, admonished him! I like to believe that I accomplished something in this case: perhaps there was satisfaction in hearing that word went forth among the professors of that particular cult to "ware Cheever!"

A practical matter which should be mentioned relates to the attitude and duties of a physician as a witness in court. You can be subpoenaed like anyone else and must testify to facts in your possession; if you are asked your opinion or a hypothetical question, you have a right to insist that you be qualified as an expert witness. It has before been stated that no communication between doctor and patient is privileged in a Massachusetts court. Expert testimony in the innumerable cases in which a medical opinion plays a part should be an opportunity for the physician to render important public service, but as a matter of fact, since he is almost always called by counsel for the plaintiff or defendant, there is strong incentive for him to become a medical advocate, and the limitations of the rules of evidence and the ingenious harassment of the cross-examination often make him feel that he has actually been unable to say exactly what he wanted. A special perplexity confronts the physician when he is asked to testify for the plaintiff in a suit for malpractice against a brother practitioner. So loth are most doctors to do this that there is complaint

on the part of lawyers that it is next to impossible to get a doctor to even averred that he would not punish one member for testifying against another. There is of course no ground for such a statement. Organized medicine simply requires that in this as in all other professional duties its members be guided by strict honesty and fairness. As a matter of fact, most cases of malpractice that are tried in court have little or no merit and are simply efforts on the part of a patient and his lawyer to turn an unavoidable misfortune to pecuniary advantage; the few cases in which the defendant physician is legally at fault are usually settled out of court. A physician asked by a lawyer to testify against another, should examine the records and inquire into the circumstances with the greatest care, should go over the matter with the defendant physician and consider carefully what he would have done if he had been placed in the defendant's position, and should convince the attorney that he proposes to be uncompromising in his refusal to permit himself to become an advocate. It is almost unbelievable that some physicians will lightheartedly agree with a lawyer friend to testify in court and answer hypothetical questions without having done any of these things, when the price of the loss of the suit by the defendant physician may be his reputation and many thousands of dollars. Such action on the part of a member of a medical society is indeed ground for critical inquiry by its officers.

Is it imperative and wise, or unwise and wrong, to tell the patient the truth about his disease and its prognosis? This question arises of course almost solely in cases of cancer. There are three types of people to be considered: first, those of mature age who ask for the truth in such a manner as to leave no doubt of their sincerity—these people are exercising their personal right to information and should be told with such mitigations as are possible; secondly, those who ask in a halfhearted way and do not press the question and in the circumstances of whose lives there appears to be no cause to feel that the knowledge is needed for any reason; and finally those who do not ask. How foolish it would be to tell a woman—a cancerphobe as most women are—who has undergone a successful operation known statistically to promise 75 per cent of five-year cures, that her disease was cancer! How cruel to tell a woman ignorant of her hopelessly malignant internal disease and happy in her fancied security, if there are no vital issues to be settled before the end. There is no disagreement, I think, on the rule that one nearest and most responsible

relative or friend should be told the exact situation as you see it, again with what mitigation and exceptions you can honestly make; then tell no other questioners, but refer them to the confidant whom you have chosen. Whether or not an actual prevarication is permissible must be left to your own conscience, but it is rarely necessary, since tact and evasion will usually suffice, but perhaps, like me, you cannot see the fine distinction between these courses.

Rereading what I have written, the same thought occurs to me as did when I somewhat reluctantly agreed to undertake this lecture, namely, that these problems of medical ethics seem trivial and hardly worth considering while catastrophic forces of greed and cruel brutality are tearing to pieces the world of democratic culture in Europe and Asia, and even more widely the formerly accepted canons of morality in social behavior and in the economic field are being questioned and shaken to their foundations. But it is precisely at such a time that one must hold fast to what is good. Even now our profession, in company perhaps with but one or two others, motivated by as pure ideals as are possible to earthly man, is pursuing its self-appointed destiny of relieving illness and pain wherever possible. It is a noble profession in its possibilities for service, but its nobility will be but a name unless it is practiced nobly. Never

were the responsibilities greater of those who now practice and teach it and of you who are being trained to the succession. The chemical and physical agents that science has placed in our hands are powerful for harm as well as for good, and constant study is the price we pay for the ability to render our patients the service that is their due. Attacks on our profession by social demagogues, the general spirit of questioning of and revolt against authority, which is rife in the community, sometimes the little knowledge that is proverbially so dangerous, which is fed to the people by many sources—all these tend to undermine the confidence of the public in the medical profession, and every candid, thoughtful man among us knows that the selfishness, intolerance and greed of a few of our members are contributing to the same result. At our school here you have gained factual knowledge, clinical experience and an appreciation of the scientific method, but it would be a sorry thing indeed if you had not found and admired in your teachers those qualities of the heart and spirit that are more potent than science itself to make our profession a noble one. During forty-four years I have lived and had my being among our teachers and students, and I think that I can assure the shade of Dr. Gay that we are carrying on!

193 Marlboro Street

THE MENOPAUSE: A HORMONIC AND THERAPEUTIC STUDY*

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ALTHOUGH repeated investigations¹⁻⁴ have identified the changes in hormone balance that accompany cessation of menstruation at the menopause, and have shown that available hormone extracts are effective in compensating this dyscrasia, the treatment of the menopausal patient is still a vexatious and often unsatisfactory task, and there is no unanimity concerning the indications for treatment, hormonal or otherwise, during the so-called "change of life." Novak⁵ states that the majority of women need no organotherapy whatever during the menopause, whereas Hawkinson,⁶ from a study of 1000 cases, believes that "menopause without distress is unusual." More specifically, Frank, Goldberger and Spielman⁷ carried out an enormous number of assays of estrogens and gonadotropins in the urine and blood of menopausal women, and found evidence of anterior pituitary overload in the blood in less than 50 per cent of such patients. Geist and Mintz⁸ call attention to the lack of correlation between the excretion of these hormones and the presence of menopausal symptoms. Albright⁹ concluded from his careful study that the vasomotor symptoms of the menopause are due directly to an overproduction of prolactin, and that when this overproduction is controlled by estrin therapy, those symptoms are either markedly diminished or disappear, whereas Frank, Goldberger and Salmon¹⁰ believed that no permanent relief results from estrin treatment. Pratt and Thomas⁹ report that in a series of 100 patients relief was obtained about equally from treatment with estrogens, phenobarbital, lactose, injections of oil containing no estrogen and bromide.

These apparently conflicting opinions leave "confusion worse confounded," unless they can be explained by further study of the menopausal syndrome. At the outset of such a study, several established facts must be recognized, the most important of which is that the syndrome in question is almost unique, since the diagnosis is usually made, not by the physician, but by the patient, and since the symptoms are almost entirely subjective, protean in character, and not related to any demonstrable physical signs. It is quite

possible that more than one factor is responsible for the menopausal syndrome, and the great variance of the symptoms encountered in different patients is strong presumptive evidence of their multiple causation. Further study is still needed to determine the correlation between the hormone assays, the predominant symptoms and the responses to different forms of treatment in a significant number of patients.

To that end, this report includes only patients for whom the above data were satisfactorily determined. On admission to the clinic, each patient was examined thoroughly in the medical department before being referred to the Endocrine Clinic, where an additional history of the duration, severity and type of symptoms was obtained, and the hormone assays and other indicated studies were carried out. In taking the histories, an effort was made to get a spontaneous statement from each patient concerning her symptoms, because it was believed that this method would help to determine their relative severity and importance. The presence or absence of typical symptoms not mentioned by the patient was then determined by direct questions. For an initial period of approximately two weeks, or until the hormone assays of the urine were completed, every patient, irrespective of the type of symptoms she complained of, was treated with injections of sesame oil or with a sedative—bromides or phenobarbital. When the assays were completed, the patients with positive prolactin tests were given injections of estrin in oil[§]; the usual dose was 10,000 rat units two or three times a week, but varied somewhat from patient to patient. Those with negative tests continued the initial therapy until its effect could be determined. If no improvement occurred, one of the other forms of treatment was substituted. In no case was the patient informed of the change from sesame oil to estrin in oil, or the reverse. When it seemed advisable and practicable, hormone assays were repeated during and at the end of treatment.

By this method it was possible, in 100 of the 131 women studied, to compare the results of the three forms of treatment in each patient, and in most cases to correlate both symptoms and results of treatment with the hormone assays. For convenience, symptoms were divided into three groups:

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§Theelin in Oil and Progynon B, supplied, respectively, through the courtesy of Parke, Davis and Company, Detroit, and Schering Corporation, Bloomfield, New Jersey.

those apparently associated with unstable vasomotor control, those obviously due to nervous instability, and those labeled, for want of a better term, "metabolic symptoms." In this last group were placed such uncommon symptoms as marked physical exhaustion not associated with nervous depression, and arthralgia without demonstrable joint disease. The patients were divided into two groups: those whose urine gave a positive test for prolان, and those whose urine contained no demonstrable prolان. No attempt was made to group patients on the basis of the estrin determinations, because no correlation could be established between a patient's symptoms and the presence or absence of small amounts of estrins.

The patients were therefore separated into two groups, according to the results of the urinary prolان assays, and the same criteria were applied to each. The groups were practically identical in size: 48 patients yielded positive tests for prolان, whereas negative tests were obtained in 52. It is perhaps significant that there was a considerable difference in the average age of the two groups—44.0 years for the positive, and 49.5 years for the negative. Eliminating all patients in whom menopause had been artificially induced did not alter the difference significantly: the negative group still exhibited 5.3 years' seniority.

A similar difference was found in the duration of the symptoms. The average duration in the patients whose urine yielded a positive prolان test was 2.4 years, in those with negative tests 3.2 years. Excluding induced menopause, the averages became 1.4 and 2.5 years respectively. It is, of course, impossible to accept as accurate a patient's statements about the duration of symptoms, but the error was probably equal in each group and was consequently not significant. Even in patients in whom menopause had been induced by surgery or irradiation, and who therefore could be definitely dated, the differences persisted practically unchanged: 3.8 years for the positive group, and 4.9 years for the negative. The greater average age, and the longer duration of symptoms suggest that the women who composed the prolان-negative group may have passed through the endocrine disturbance characteristic of the menopause, and that they may have achieved the hormone balance characteristic of postclimacteric, symptom-free patients.

This possibility acquires practical significance when the predominant symptoms of the two groups are compared. In 81 per cent of patients in whom the prolان test was positive, the vasomotor symptoms—flashes, headache and giddiness—dominated the picture, and the patients either did not complain of psychic or nervous disturb-

ances or attributed them to the irritation of the constantly recurring and often severe vasomotor symptoms. Many stated that if they could be rid of the latter, they would be perfectly well. In 61 per cent of the prolان-negative patients, on the other hand, the presenting symptoms were almost purely characteristic of a psychoneurosis, and the vasomotor symptoms dominated in only 15 per cent. In the remainder, vasomotor and psychoneurotic symptoms were so inextricably interwoven that it was impossible to weigh them satisfactorily. All such patients, however, gave a history of nervous instability that antedated the menopause by many years. It seems fair to conclude, therefore, that they represented a combination of endocrine and nonendocrine instability in which it is impossible to evaluate satisfactorily the role played by either condition.

If the two contrasting clinical pictures just outlined depend on different hormonal situations, their response to hormone treatment should differ sharply. An analysis of the results of treatment showed that 90 per cent of the prolان-positive, vasomotor group improved definitely with adequate estrin therapy, whereas only 25 per cent of the prolان-negative, psychoneurotic group were similarly benefited. The converse is also true, since only about 20 per cent of the former were helped by sesame oil or sedatives, whereas approximately 80 per cent of the latter improved very definitely during treatment with one or the other of those preparations. Inasmuch as the change from sesame oil to estrin injections could not possibly be detected by the patient, the error due to a possible psychologic factor seems considerable.

From these figures it seems justifiable to construct a working hypothesis concerning women who seek relief from symptoms that they ascribe to the menopause. Their symptoms comprise two more or less distinct groups. In one they are preponderantly those of vasomotor instability, are associated with an excess of prolان in the urine and are relieved by treatment with estrogenic extracts in quantities sufficient to cause its disappearance from the urine. This conclusion is in agreement with the work of Albright.⁴

In the other, slightly larger group, psychoneurotic symptoms predominate, prolان is rarely found in the urine, and treatment with estrogenic extracts fails to give relief in a significant majority of cases; sedatives and psychotherapy are as a rule more effective. On the average, these patients are 5.5 years older than those in the contrasting category, and have had their symptoms over a year longer when they present themselves for treatment. These differences suggest that they have passed

through the period of endocrine imbalance, which from the point of view of endocrine therapy defines the actual menopause, and that they are more properly to be regarded as having reached the postmenopausal or senescent stage of pituitary ovarian reciprocity. Since hyperprolactinism cannot be the cause of their nervous instability, some other explanation must be found. That explanation, we believe, lies partly in the psychic and nervous make up of the patient, and partly in the fact that for centuries women have been led to expect nervous disturbances, as well as hot flashes, as inescapable features of the menopause. The psychoneurotic symptoms, therefore, represent a conditioned reflex activated by the obvious cessation of menstruation, and often aggravated, by other coincidental stresses. It must always be remembered that hyperprolactinism occurs in only a small fraction of menopausal women, the majority of whom "need no organotherapy whatever," since "their symptoms are either slight, or are controlled by reassurance, avoidance of stress, physical or mental, or perhaps by simple sedatives."

Between the vasomotor and the psychoneurotic groups, and exhibiting various combinations of the symptoms characteristic of each, lies a third and smaller group in which symptoms of both vasomotor and psychoneurotic instability are about equally prominent. The patients composing this group are most difficult to help. Careful questioning, however, will usually disclose the fact that their nervous instability antedated, although it may have been further activated by, the menopause, and that it will respond better to simple psychotherapy and judicious use of sedatives than to estrogenic therapy. The latter, however, may be useful in relieving them of vasomotor symptoms. In this group, hormone assays are essential to correct treatment, since the hormone status of the patient can be determined in no other way.

CONCLUSIONS

In only a small minority of women are the symptoms associated with "the change of life" sufficiently severe to compel them to consult a physician.

A test for prolactin in the urine was positive in only 48 of 100 women admitted to our clinic because of the severity of their menopausal symptoms. In 81 per cent of this group the symptoms were preponderantly those of vasomotor instability, and 90 per cent of these patients were definitely benefited by adequate treatment with estrin.

In the remaining 52 per cent the test for urinary prolactin was negative. Treatment with estrin caused improvement in only 25 per cent of the patients treated, whereas simple psychotherapy or sedation brought relief in over 80 per cent. The patients in this group were older, and had had symptoms significantly longer, than those who were benefited by estrin treatment.

No relation was evident in either group between the presence or absence of estrin alone and the character or severity of symptoms.

A predominance of vasomotor symptoms in a menopausal woman is suggestive of an overactive prolactin production, but treatment with estrin should not be instituted until urinary assay proves that prolactin is being excreted. Coincidental estrin determinations are interesting but not essential.

If treatment with estrin is indicated, it should be given in effective amounts. Failure to relieve the vasomotor symptoms in a patient with positive prolactin assays is probably due to insufficient dosage. The effective dosage in any patient is an individual equation.

REFERENCES

- 1 Zondek B. Ueber die Hormone des Hypophysenvorderlappens. IV. Darstellung des Follikelreifungshormons (Prolactin A) — Methodik der klinischen Harnanalyse zum Nachweis des Prolactin. *Klin Wochenschr* 9:1207-1209 1930.
- 2 Allen E. *Sex and Internal Secretions: A survey of recent research*. 551 pp. Baltimore: Williams & Wilkins Co. 1932.
- 3 Frank A T, Goldberger M A and Spielman J. Present endocrine diagnosis and therapy. *J A M A* 103:393-402 1934.
- 4 Albright F. Studies on ovarian dysfunction. III. The menopause. *Endocrinology* 20:24-39, 1936.
- 5 Novak E. The therapeutic use of estrogenic substances. *J A M A* 104:1815-1821 1935.
- 6 Haskinson L F. The menopausal syndrome: one thousand consecutive patients treated with estrogen. *J A M A* 111:390-393 1938.
- 7 Geist S H and Mintz M. Iutinary radiation for the relief of menopause symptoms. *Am J Obst & Gynec* 33:643-645 1937.
- 8 Frank R T, Goldberger M A and Salmon N J. The menopause symptoms: hormonal status and treatment. *New York State J Med* 36:1363-1371 1936.
- 9 Pratt J P and Thomas W L. The endocrine treatment of menopausal phenomena. *J A M A* 109:1875-1880 1935.

ALCOHOLISM: SOME CONTEMPORARY OPINIONS*

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BOSTON

A SYMPOSIUM on alcoholism was held in Philadelphia on December 27, 28 and 29, 1940, during the annual meeting of the American Association for the Advancement of Science, sponsored by the Research Council on Problems of Alcohol. Six special sessions were closed by a public meeting on the evening of December 29. All sessions were well attended by physicians, psychiatrists, sociologists, lawyers, members of the clergy and others.

The program was planned to cover all aspects of the alcohol problem, beginning with physiologic and chemical considerations and the clinical aspects, to which the first day was devoted. The neuropsychiatric features and the treatment and prevention of alcoholism were the subjects of the second day. The third day was devoted to social and legal problems. The final address, in addition to the original contribution of Dr. Abraham Myerson, summarized and discussed the entire field and pointed out several trends that would affect the immediate future of research on alcoholism.

In his introductory remarks on the morning of December 27, Dr. Winfred Overholser, superintendent of St. Elizabeths Hospital, Washington, D. C., described the nature and extent of alcoholism. He cited illustrative statistics, and, as one of the founders, he outlined the history and aims of the Research Council on Problems of Alcohol, as well as the purpose and plan of the symposium. Dr. Overholser stated:

Although the enlightened of today recognize excessive and prolonged use of alcohol as a disorder of conduct, a disease, in some instances at least, amenable to treatment, it is a fact that throughout the United States, with the exception of the large cities, practically the only institution in which an acutely intoxicated person may be cared for is the local jail. Drunkenness in a public place is still a penal offense and, in all too many cases, it is the rule to give a short sentence to the person who is brought before the court on a charge of public intoxication, even though the judge, the court attachés, and the jail officials realize that release from jail is all too likely to be practically synonymous with further intoxication and further sentence. . . . It is extremely difficult to say just how many alcoholics there are at the present time in the United States. The statistics of arrest indicate that annually well over 100,000 persons are arrested on a charge of drunkenness, about 27,000

on a charge of driving an automobile while under the influence of liquor, and about 27,000 on a charge of disturbing the peace, an offense often associated with over-indulgence in alcohol. In addition, over 4900 persons were committed to mental hospitals in 1938 by reason of alcoholic psychosis and nearly 7600 for alcoholism without psychosis; statistics are not available as to the number admitted to the alcoholic wards of the various municipal hospitals. . . . It is safe to say that there are in the United States probably more than 100,000 persons suffering from alcoholism at the present time. Thus, with tuberculosis, cancer, syphilis, mental disease and infantile paralysis receiving competent and intelligent medical attention, we now have alcoholism as the greatest public health problem at the present time which is not being systematically attacked.

The session on physiologic and chemical considerations of alcoholism, at which Dr. Overholser presided, was opened by a paper on "The Influence of Alcohol on the Alimentary System" by Dr. A. C. Ivy, of the Northwestern University Medical School, who reported a study on the effect of alcohol on the motility of the colon and the secretion of bile. In dogs, he found that alcohol given by any route in amounts sufficient to produce moderate-intoxication tended to depress the nonpropulsive and to augment the propulsive motility of the colon. The latter results were substantiated in human subjects who were given 250 cc. of Bourbon whiskey by mouth. Dr. Ivy believed that these observations provided an explanation for the irregular relief of colonic colic after ingestion of alcohol and the tendency of alcohol to cause diarrhea in certain persons. Dr. Ivy also reported his experiments in feeding 40 cc. of alcohol daily for two days to dogs with biliary fistulas. He found that there was evidence of definite injury to hepatic cells, that there was a distinct change in the chemical constitution of the bile, and that the odor of alcohol was apparent. The cholic acid content was decreased, but the animals became normal within two days after the alcohol was discontinued.

Dr. F. A. Hitchcock, of the Department of Physiology, Ohio State University, reported on "The Alterations in Respiration Caused by Alcohol." He had found that alcohol seems to accentuate normally occurring peculiarities in breathing as well as to produce a more rapid and often shallower type of respiration. In many cases, an increase in the total pulmonary ventilation might be interpreted as a stimulation of the respiratory center

*A report on the Symposium on Alcoholism of the Research Council on Problems of Alcohol at the annual meeting of the American Association for the Advancement of Science, Philadelphia, December 27, 28 and 29, 1940.

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by alcohol. In two out of three subjects, the sensitivity of the respiratory apparatus was decreased to both carbon dioxide and to oxygen lack after taking alcohol. In one case, the subject showed indications of increased sensitivity, which suggests that the reaction of the other two subjects was the result of the brief duration of the period of increased sensitivity, which, if actual, may be of short duration and may be followed by a period of hyposensitivity. The alveolar carbon dioxide tension decreases in the first half hour after ingestion, and then returns to a value equal to or greater than that found before alcoholic ingestion.

'The Hypoglycemic State in Alcoholism' was the title of a paper presented by Dr H D Palmer, of the Institute of the Pennsylvania Hospital. Dr Palmer reported a number of cases in which alcoholism was a prominent symptom; in his study he found that a number of the patients showed an atypical carbohydrate metabolism, as indicated by their sugar tolerance curves. Regulation of the diet tended to correct this condition in certain cases by stabilizing the carbohydrate metabolism and energy expenditure, and resulted in some relief of the symptom of drinking. Dr Palmer's detailed findings were of especial interest not only on account of their relation to alcoholism but also because of their bearing on hyperinsulinism and neuropsychiatric conditions involving abnormal behavior patterns.

Dr Henry Newman, of Stanford University School of Medicine, discussed 'The Problem of Acquired Tolerance to Alcohol.' Prior to Dr Newman's study there were few satisfactory data on acquired tolerance to alcohol in human subjects except for comparisons between the metabolism of habituated and nonhabituated subjects. The hypothesis that delayed absorption of alcohol might be responsible was found by Dr Newman to be inadequate, nor could the possibility of delayed penetration of alcohol into the nervous system serve as an explanation of variations among different patients. Dr Newman and his associates were able to show by experimental techniques that habituated subjects do not metabolize alcohol faster than nonhabituated animals. They concluded that actual tolerance to alcohol, if it can be acquired, must depend on tissue tolerance or on a difference in the behavior of the cells of the central nervous system to a given quantity of alcohol, as compared with similar reactions in nonhabituated subjects.

A paper on 'The Effect of Alcohol on the Electroencephalogram' was presented by Dr Hillock Davis, of the Department of Physiology, Harvard Medical School. This work had been done

in collaboration with the Department of Neurology and the Neurological Unit, Boston City Hospital. Dr Davis, Dr Frederic Gibbs and their associates studied the encephalographic tracings of six men to whom a measured quantity of alcohol had been given (2 cc per kilogram of body weight). Psychometric examinations were made by Mr Lowell S Trowbridge, and blood alcohol determinations were made at intervals throughout the experiment. A spectrum analysis of several of the records by means of the Grass analyzer showed a reduction in energy on the fast side of the frequency spectrum, particularly in the range from 10 to 13 cycles, at relatively low concentrations of alcohol. At higher concentrations of blood alcohol, there were episodes of slow waves (4 to 8 cycles) that intruded into the subjects' characteristic electroencephalographic patterns and appeared in the spectrum analysis as an increase in energy in the corresponding frequency band. The performance on the psychometric tests—particularly the addition of consecutive digits, the reversed-clock problem and the strength of grip—was definitely impaired while the concentration of blood alcohol was at its height (125 to 140 mg per 100 cc) and for an hour thereafter, but became approximately normal in four or five hours. When the patients were clinically sober, the blood alcohol remained elevated and the electroencephalogram was still modified. The poor performance on the psychometric tests was associated with slurring speech, ataxia and emotional changes.

Dr Curt P Richter, of Johns Hopkins University School of Medicine, reported a series of feeding experiments in which the characteristics of alcohol as a food were considered. The study indicated the concentrations of alcohol that were acceptable to the animal subjects and permitted the exercise of choice by them. Dr Richter's observations indicated how psychologic elements may operate in the choice of beverages.

It has been generally assumed that alcohol exerts a marked effect on the circulation because of the flushing and increased pulse rate it produces. Experimental studies as described by Dr Arthur Grollman, of Johns Hopkins University School of Medicine, showed that it actually exerts only a minor effect on the circulation, and that this does not reflect any significant change in cardiac activity. The isolated heart is not affected by concentrations that might be encountered in a human subject. Such changes as occur in the lower animals are to a large extent secondary to other changes in the organism. Alcohol causes an increased circulatory activity in the normal human subject, but the magnitude of response is so small

that a stimulant action on the circulation cannot be inferred. According to Dr. Grollman, the so-called "beer-drinker's heart" is probably due to the plethora induced by large volumes of malted fluids rather than to their alcoholic content. The ingestion of equal amounts of alcohol-free saline solution for the same period would probably induce a similar disorder. The apparent stimulating effect of alcohol in conditions involving circulatory insufficiency is probably due to reflex stimulation of the gastrointestinal tract.

Dr. M. Geneva Gray, of Harvard Medical School, discussed "The Effect of Stimulants of Cellular Oxidation on Alcohol Metabolism," especially the higher homologues of dinitrophenol. These compounds had been studied by Heymans, who suggested that they might be more active and less toxic than the latter substance in stimulating cellular metabolism. In Dr. Gray's experiments, the blood alcohol concentration of animals given a measured amount of ethyl alcohol by oral administration was determined at intervals during three-hour experiments, and the same procedure repeated about a week later, at which time one of the higher dinitrated phenols was administered in addition. Dinitrocyclohexylphenol, dinitrothymol, dinitro-orthocresol and sodium dinitro-orthocresol were found to increase the oxidation of alcohol in cats. They were also found to be effective in increasing the *in vitro* oxidation of alcohol in the presence of fresh liver and muscle tissue, but to a lesser degree. Because of the potential toxicity of these drugs, Dr. Gray stated, they cannot be recommended for use in human subjects, but the results suggest a pharmacologic approach to the treatment of acute alcoholism. It is possible that if the undesirable side actions could be eliminated or attenuated by synthetic technics, substances of this general type might be utilized in active therapy.

A paper on "The Metabolism of Alcohol" by Dr. Thorne Carpenter, of the Carnegie Institution of Washington, at Boston, was read by title. The need for clarification of many points regarding the metabolism of alcoholism was pointed out, and the previous work that had been done was shown in relation to the aspects of the subjects, which remain problematical.

The clinical aspects of alcoholism were the subject of the afternoon session on December 27. Dr. Philip Piker, of Cincinnati, read a paper entitled "The Symptoms of Alcoholism," in which he described the appearance and behavior of persons under the influence of varying amounts of alcohol. The attempted correlations between alcoholic symptoms and blood alcohol levels should be regarded with skepticism in the light of Dr.

Piker's findings with rabbits and human subjects.

Dr. H. Houston Merritt, of Harvard Medical School, spoke on "The Examination of the Alcoholic Patient," and described the many conditions that may be present coincidentally with alcoholic intoxication and serve to complicate the clinical picture. These include skull fracture, diabetic or uremic coma, various abnormal mental states and intoxications caused by other toxic agents. He emphasized the necessity of correct diagnosis in beginning appropriate treatment without delay. Dr. Merritt stated that examination of the cerebrospinal fluid can be particularly useful in the diagnosis of alcoholism.

"Chemical Tests in the Diagnosis of Acute Alcoholic Intoxication" was the contribution of Dr. Walter Jetter, of the Taunton State Hospital and the Department of Legal Medicine, Harvard Medical School. His paper comprised a critical survey of the available methods for the objective determination of alcohol in body fluids and tissues and described a new procedure devised by the author in which a sample of expired air forms the material for analysis. The results of psychologic tests, which had been correlated with chemical findings, were also presented.

The effect of chronic and acute alcoholism on the organs and tissues of the body, except for the liver, is not specific for alcohol. Changes that do occur are low grade, such as chronic irritation and mildly inflammatory processes possibly resulting in atrophy of the gastric mucosa, edema of the brain and irritation of the meninges, together with possible alterations in the kidneys. Cirrhosis of the liver is the only condition in which alcohol appears to play more than a minor part. These facts, pointed out by Dr. Arthur W. Wright, of Albany Medical College, suggest that the effect of alcohol, like that of other substances, is mainly physiologic and chemical rather than structural.

A new terminology was suggested by Dr. Norman Jolliffe, of Bellevue Hospital, New York City, for the diseases previously considered to be exclusively the result of alcoholism but now proved to be the effect of vitamin-deficient diets. Dr. Jolliffe suggested the terms "deficiency polyneuritis" instead of "alcoholic polyneuritis," "nicotinic acid deficiency encephalopathy" instead of "wet brain" and "pellagra" instead of "alcoholic pellagra" or "pseudopellagra." He pointed out that all deficiency diseases known to occur in man, such as scurvy, ariboflavinosis and vitamin A deficiency, also occur in alcoholic patients.

"The Causes of Death in Alcoholism" was the title of a paper by Dr. Timothy Leary, Medical Examiner of Boston. From his long and ex-

tensive experience, Dr. Leary reviewed a series of 1000 alcoholic deaths and pointed out that the alcoholic patient frequently dies from causes unrelated to alcohol itself. These include trauma, strangulation from unmastered food or vomitus, rupture of the cardia or hemorrhage resulting from vomiting, frost-bite gangrene, pneumonia and other conditions related to exposure and avitaminoses, particularly those with central-nervous-system manifestations. Only one third of the patients in the cases reported died of acute alcoholic intoxication. That alcoholism is a disease and as such can be prevented more readily than it can be cured was stressed in this paper and in the following one by Professor Anton J. Carlson, of the Department of Physiology, University of Chicago.

Dr. Carlson spoke on "The Alcohol Problem: Possible lines of useful research." He pointed out that a great deal of information is available regarding chronic alcoholism and temporary inebriety, and that the use of any amount of alcohol that impairs the personal, economic and social efficiency stands condemned. The realization that alcoholism is a contributory factor in producing crime and highway accidents and that it has an effect on longevity and on the germ plasm appears to be a more promising phase of research than extensions of previous studies on the effect of alcohol on the patient. The chief unknown factor in the problem remains the question why alcohol in a given amount will cause one person to become seriously intoxicated and will not affect another.

The morning session on December 28 was devoted to the neuropsychiatric features of alcoholism, and was opened by Dr. Foster Kennedy, of Cornell University Medical College, with a paper on the neurologic features encountered in chronic alcoholism. Dr. Kennedy reviewed the better-known syndromes and spoke with emphasis about alcoholic polyneuritis and cerebral conditions complicated by alcoholism. The clinical results of alcoholism in families were also discussed. Dr. Kennedy expressed the opinion that alcoholic indulgence was a factor that precipitated seizures in epileptic personalities and aggravated epilepsy when it was present in alcoholics. Dr. Kennedy's remarks were distinguished not only by their concise and scholarly quality but by the pleasing manner in which they were presented. His reference to the epidemic neuritis of 1903 at Manchester, England, was especially interesting.

Dr. Leo Alexander, of Harvard Medical School, presented a paper on "Neuropathological Findings in the Brain and Spinal Cord of Chronic Alcoholic Patients," illustrating it with many photo-

graphs of actual brain and cord specimens. Dr. Alexander stated:

The microscopic findings may be divided into two main groups: one group in which the neural parenchyma is damaged directly and primarily, best summarized under the term neuronitis, and the second group in which the neural parenchyma is affected only indirectly by means of primary damage to the vascular system, a syndrome which has been termed Wernicke's disease. . . .

Wernicke's disease can be defined pathologically as a syndrome characterized by small foci with degeneration, varicose deformity, and endothelial and adventitial proliferative change of vessels, and subacute necrosis of the parenchyma, which are found predominantly around the ventricular system. Small petechial hemorrhages may frequently (but not always) be present throughout the lesions. Wernicke himself named the disease "polioencephalitis hemorrhagica superior et inferior."

This disease has recently been reproduced in our laboratory in a series of animal experiments adapted to create a state of vitamin B₁ deficiency more severe than that which is sufficient to cause neuronitis. This experimental disease is topographically and histopathologically identical with Wernicke's disease in man. This disease is furthermore identical with a disease produced in foxes who have been allowed to over-indulge in raw fish.

We may, therefore, be justified to regard Wernicke's disease as caused by extreme depletion of vitamin B₁ or, more specifically in this instance, of thiamin chloride. This extreme depletion can be furthered by an over-abundant supply of other vitamins, particularly of riboflavin phosphate and of vitamins A and D. These and other combinations of over-dosage with deficiency have been used directly in our animal experiments. A similar situation is created by a raw fish diet, fish being rich in vitamins A and D and riboflavin, but deficient in vitamin B₁. In Japan, fishermen [who eat raw fish freely] are a group most outstandingly afflicted by beri-beri.

The majority of pathologic conditions encountered in the nervous system of chronic alcoholic patients is therefore attributable to associated vitamin deficiencies. These vitamin deficiencies are due to decreased intake by the alcoholic patient's choice or habit, decreased utilization by the diseased gastrointestinal tract, increased requirement by the increased caloric burden of metabolism, and possibly by a still unascertained specific destructive chemical effect of alcohol and fusel oils on ingested vitamins.

"The Effect of Alcohol on the Functions of the Nervous System" was described by Dr. Ross A. McFarland, of the Fatigue Laboratory, Harvard University. The psychologic findings on the mechanism of the action of alcohol bear out the theory that the main effect is cortical with an adventitious peripheral effect. Dr. McFarland pointed out that the most urgent need in psychologic experimentation is the exploration of individual tolerance to alcohol in contrast to acquired tolerance, which is termed "habitation." Such

a project can be carried out to the best advantage by the co-operation of physiologists and psychologists.

Dr. David Wechsler, of Bellevue Hospital, New York City, presented material on "The Effect of Alcohol on Mental Activity." Dr. Wechsler stated:

In appraising the effect of alcohol on mental activity, it is necessary to distinguish between transitory changes observed in acute alcoholic intoxication and the reputed permanent changes following chronic alcoholism. Observations regarding mental changes in the two conditions, while mutually supportive, are not interchangeable. Data regarding the effects of acute alcoholic intoxication are derived largely from circumscribed experimental studies with relatively few subjects, and concern themselves primarily with changes in mental psychomotor functions following the ingestion of variable doses of alcohol. Results of these studies reveal measurable loss in mental efficiency in most of the functions investigated.

Controlled studies on the mental effects of chronic alcoholism, though occasionally based on larger numbers, have usually been made under such variable conditions as to furnish data hardly more valid than those obtained through clinical observation. These studies confirm the loss in mental efficiency observed under experimental conditions and, in general, indicate a progressive, though uneven, deterioration in the global functioning ability and personality structure of the chronic alcoholic patient. Outstanding is the impairment of the subjects' ability to integrate, particularly at the higher functioning levels.

Dr. Wechsler's paper summarized these tendencies as revealed in available published data and as shown in his study of 40 patients with chronic alcoholism admitted to the Bellevue Psychiatric Hospital during the period 1938-1940. The value of the quantitative methods of clinical psychology was demonstrated, and the possibilities of further study by these procedures were discussed.

"Alcoholism and Mental Disease" was the subject of a paper by Dr. Nolan D. C. Lewis, of the Psychiatric Institute of New York, who differentiated between the various mental disorders due to, or acutely released by, overindulgence in and special sensitivity to alcohol. Dr. Lewis discussed the personality factors and characteristic reactions as they appear in such conditions as pathologic intoxication, delirium tremens, acute hallucinosis, paranoid developments and alcoholic deterioration. Some of these disturbances were, in Dr. Lewis's opinion, an expression of other psychoses. The role of alcohol in certain neurogenic conditions was discussed, and the relation of these disorders to other determining elements was brought into relief.

A paper by the late Dr. Paul Schilder on the "Psychogenesis of Alcoholism" was read by Dr. Merrill Moore. According to Dr. Schilder:

The chief effect of alcohol on psychologic function is that of reduced efficiency. There is a strong tendency toward impoverishment of associations and an egocentric form of behavior. The basic pattern of drinking varies with the situation of the individual and may be accompanied by an associated breakdown of sexual and aggressive impulses. Early childhood experiences may have required a variation in the pattern of sexuality which may appear during intoxication and may be characterized by violence. Acute alcoholic intoxication differs in the chronic alcoholic patient from that seen in an individual who is intoxicated for the first time. In the former, acute intoxication brings forward much primitive behavior with a corresponding increase in anxiety, the threat of which does not remain in the sphere of social insecurity but extends to sexual threats and even to the threat of castration and dismemberment. The chronic alcoholic patient has lived from earliest childhood in a state of insecurity, and alcohol appears to reverse this situation—at least during the period of its influence. The attitudes of parents toward children which will promote security and a normal amount of aggression and which will guarantee a reasonably free development of sexual adaptation will be powerful factors in the prevention of alcoholism.

Dr. Alexandra Adler, of Harvard Medical School, speaking on "The Individual Psychology of the Alcoholic Patient," stated:

Alcoholism, as well as many other neuroses, represents an escape from challenge and possible defeat. Alcoholic patients are usually unwilling or unable to assume responsibility, considering themselves victims of a mysterious addiction which they feel precludes the assumption of responsibility by them. The difference in the psychology of the chronic alcoholic patient and the dipsomaniac or periodic drinker appears to be quantitative. It is said that impotence is frequent in alcoholic patients and that this causes much of their psychopathology. The individual patient may claim abnormally strong sexual powers or he may be associated with homosexual circles. A jovial mood is typical of many chronic alcoholic patients, a fact which may amount to a minimizing of the importance of certain situations and thus form an escape from the need to assume responsibility. The psychotherapy of alcoholism is not greatly different from that of other neuroses but is more difficult and is complicated by the lack of reliability of the patient and the indifferences to responsibility, as well as a marked degree of shame over previous behavior.

Dr. E. Morton Jellinek, of New York City, speaking on "Heredity, Constitution and Alcoholism," reviewed some frequently quoted statistics on alcoholism, especially those offered as evidence of hereditary factors in relation to alcohol. His scholarly analysis and his critical comments were significant and instructive. Dr. Jellinek touched briefly on the work he had in progress. In concluding, he referred to the literature and summarized some current opinions concerning the hereditary aspects of alcoholism.

Mr. Lowell Trowbridge, of Boston, gave a pa-

per on "Alcohol Absorption and Behavior in Chronic Alcoholic Patients" This study was made in a state hospital on a group of male patients who were diagnosed as chronic alcoholics. Each drank 15 cc of alcohol per kilogram of body weight in a grapefruit juice solution. The first hour following the ingestion of alcohol, and hourly for four hours thereafter, venous bloods were determined and overt behavior of the subjects was measured by psychologic tests. A fifth and final observation on behavior was made, and a final sample of blood was taken at the sixth hour. When the entire group was considered, there was some correlation between performance and blood alcohol concentration, but this was not apparent when individual members of the group were studied.

Dr William G Lennox, of Harvard Medical School, discussed "The Influence of Alcohol on Convulsions in Epilepsy." Dr Lennox reported a statistical study of the records of 1254 patients with epilepsy who were over fifteen years of age. Of these, 26 per cent used alcohol moderately, and 6 per cent used it to excess, these figures are not greater than those for a control group. Alcohol was used less by women than by men, and to the same extent by essential and symptomatic patients. There was a progressive increase among older patients. This increase was proportionately greater among men than among women. The number in whom alcohol was observed to be a factor in producing seizures was 6 per cent of all patients and 21 per cent of those who used alcohol. The proportion was greater among men than women, and among symptomatic than among essential patients. The proportion of seizures after the use of alcohol was less among older patients, and was much greater in patients who used alcohol frequently than in those who used it infrequently. In the group of frequent users 57 per cent reported that seizures sometimes or often followed indulgence. Dr Lennox concluded:

The physiologic or chemical mechanism by which this narcotic drug produces seizures in predisposed persons in the sobering up period is not clear. Various means of solving interrelated problems of alcoholism and of epilepsy are suggested. The need for an electroencephalographic survey of alcoholic patients and their relatives is particularly urgent.

On the afternoon of December 28, the treatment and prevention of alcoholism were discussed. Dr Wilfred Bloomberg, of the Boston City Hospital, discussed the medical treatment of alcoholism, with special reference to the use of benzedrine sulfate, emphasizing the toxic action of alcohol itself. The elimination of alcohol and dehydra-

tion were considered, together with sedation of various types. Dr Bloomberg presented a statistical report of results in 60 cases in which benzedrine sulfate was used as an aid to the treatment of the chronic phases of alcoholism.

"Treatment of the Alcoholic Addict" was the subject of a paper by Dr Robert V Seliger, of Johns Hopkins Hospital, who presented a discussion of hospital, farm and extramural treatment and the selection of the type of treatment, partly on the basis of the patient and his condition and partly on the basis of his life situations at the time. The importance of careful investigation of all medical, psychologic, psychiatric, social and behavior aspects and of all available facts of the case was emphasized by Dr Seliger. The methods and procedures followed in each type of treatment were described in detail.

Dr Karl M Bowman, professor of psychiatry, New York University College of Medicine, and director of the Division of Psychiatry, Bellevue Hospital, reviewed the literature on the treatment of delirium tremens. The opinions of different authorities on the subject were critically evaluated. Dr Bowman finally suggested a method for treatment based on the limitation of restraint to a minimum, the use of paraldehyde as a sedative, the combating of dehydration and acidosis by forcing fluids and giving malt, the use of a high-calorie diet in addition to insulin, and the use of vitamins—particularly the vitamin B complex.

The late Dr Charles E Parsons, of the Washingtonian Hospital, Boston, said in discussing "The Problems and Methods in a Hospital for Alcoholic Patients"

There were 195 convictions for drunkenness per 10 000 population in Boston for the year 1938-1939 as compared with 1131 for the same period for England, Scotland and Wales. Fifty-two per cent of the deaths from poisoning for the ten year period of 1928-1937 for Massachusetts were due to alcohol. The Washingtonian Hospital in Boston tries to do its share in meeting these problems. It cared for 454 cases between March 1, 1940 and December 1, 1940, and the mortality rate for all cases was 0.65 per cent. Because nine tenths of patients cared for are working and families are dependent on the income from the jobs, hospitalization has been limited by social and economic pressure to an average of eight days. Further care is supplemented by evening outpatient recall visits and by working parole—where the patient lives in the hospital but goes to work and returns there. This prolongs the period of protection and psychotherapy. The chief immediate problems on admission are the care of the acute alcoholic intoxication and the handling of vitamin deficiency when present. A later problem is working out psychologic and environmental adjustments.

The private psychiatric hospital was viewed by Dr. Henry M. Tiebout, physician-in-charge, Blythwood, Greenwich, Connecticut, as an important way station on the road to health. Beyond its opportunity for rehabilitating the body of the individual alcoholic patient, it has a specific job: starting the patient to think and figure straight about his problem. The paper centered about a discussion of how to effect this start toward a normal pattern of life.

Dr. Bernard Glueck, of Stony Lodge Foundation, Ossining, New York, criticized the present-day methods of treating alcoholism. He had found that the difficulties in treating the problem drinker were the resistances from patients who did not want to be cured, the commonly encountered ambivalent attitude toward treatment on the part of relatives, the absence of anxiety, discomfort and sometimes acute suffering, which in the psychoneurotic patient are the most potent motives for continuance of treatment, and the moral and esthetic prejudices that still cling to alcoholism. In view of these difficulties, it is not surprising that treatment often fails. However, as Dr. Glueck pointed out, these causes are manageable for the most part, and are not due to the inherent psychodynamics of the drinker.

Dr. Charles H. Durfee, of Rocky Meadows Farm, Wakefield, Rhode Island, undertook to correct some popular misconceptions, held by physicians and laymen alike, concerning alcoholic patients and alcoholism. He cited seven of the commoner beliefs, and then proceeded to show, from his experience in the study and treatment of alcoholic patients, the fallacies and erroneous assumptions on which these beliefs rest.

For example, contrary to the widespread notion that the use or abuse of alcohol can be controlled by will-power, Dr. Durfee maintained that will-power has relatively little to do with the problem of drinking, and that the habitual drinker cannot stop drinking merely by making up his mind not to drink. By concentrating on abstinence he is inducing a state of mind that, because of his preoccupation with the problem, is self-defeating. He is still "thinking alcohol," that is, dealing with the symptom instead of the cause, trying to think his way out of his problem instead of acting his way out. Alcohol cannot be fought: it must be circumvented, according to Dr. Durfee. The indirect approach is better than a head-on struggle with the alcoholic habit.

Dr. Durfee held that there is no alcoholic type. There are only people who drink for various reasons. Many are in need of psychiatric care. Others, whom he designated "problem-drinkers," need psychologic re-education; a few, merely re-

direction and reorientation. Similarly, there is no such thing as a physiologic craving for alcohol, he stated. The craving is fundamentally psychologic, expressed in the need for relief from tension. Once the drinker is relaxed and able to eat and sleep again, his need for alcohol may diminish.

Other misapprehensions dealt with included the fact that a person with a long alcoholic history is more difficult to rehabilitate than a young person, that the lone drinker is far more difficult to help than the social drinker, and that alcohol must be rigidly kept from the patient while he is under treatment.

Dr. Durfee also took issue with some of the so-called "cures" for alcoholism and exposed the erroneous and often spurious conceptions and claims underlying these cures. A genuine cure does not mean mere abstinence over shorter or longer periods of time, but results in or follows a radical personality readjustment that does away with the need for alcohol.

The morning session on December 29 covered the social and legal problems of alcoholism. Dr. Lawrence Kolb, of the United States Public Health Service, stated in a paper on "Alcoholism and Public Health":

Alcoholism is a serious health problem that has been handled largely by police authorities, with the result that the alcoholic patient has been treated as a criminal rather than as a sick individual. Present-day methods of handling chronic alcoholic patients are ineffective or harmful. An intensive study of the prevalence and causes of alcoholism and effects of alcohol are necessary in order to establish a sound basis for better methods of prevention and cure.

"Some Statistical Facts about Alcoholism in Massachusetts" by Dr. Neil C. Dayton, of the Massachusetts Department of Mental Health, revealed that the records of one fifth of all admissions to mental hospitals in Massachusetts between 1917 and 1933 indicate that chronic alcoholism was a prominent etiologic factor. Of 56,579 first admissions in this period, 32 per cent of the male patients were classified as intemperate in the use of alcohol, and 33 per cent in addition were found to have used alcohol to some extent. The female patients among the first admissions used alcohol much less. Chronic alcoholism was highest among these patients in 1917 and lowest in 1920. The latter year was also the lowest in total admissions to mental hospitals. Both sexes showed the highest percentage of chronic alcoholism between the ages of thirty and sixty years. The incidence of alcoholism among mental patients generally bore an inverse ratio to the educational level and the economic status. Unmarried pa-

uents showed a lower incidence of alcoholism than married, widowed or divorced persons in the group studied. The urban centers were high in alcoholism, and the rural areas were low. Foreign born persons were high in intemperance, but a change in trend seemed to have occurred within a few generations. These data were derived as part of a study made in Massachusetts state mental hospitals, sponsored by the Laura E. Spelman Rockefeller Foundation.

The major problems concern the meaning of "drunkenness" and "under the influence of liquor," the methods of proving these states exist, and the differentiation of drunkenness in relation to various other circumstances of public importance, as well as the improvement of treatment through standards based on sociologic and psychiatric knowledge, comprised the subject matter of an address by Dr. Jerome Hall, professor of law, Indiana University Law School. Dr. Hall stressed the need for uniform legislation.

Professor Edwin R. Keedy, of the University of Pennsylvania Law School, spoke of the legal responsibility of the alcoholic patient, and described the many situations in which this becomes a vital question. The relation of alcoholism to highway safety and to crimes of violence is among the commoner aspects of the legal implications of alcoholism.

Mr. Morris Ploscowe, clerk of the Court of Special Sessions, New York City, drew on his long experience with those addicted to alcohol to describe the method by which New York City handles the many persons who are arrested for drunkenness. Mr. Ploscowe admitted that these prisoners were inadequately handled, and he made a number of recommendations about their future treatment by the courts.

"The Penal and Correctional Aspects of the Alcoholic Problem," a paper by Austin H. McCormick, executive director of the Osborne Association, pointed out the need for the establishment of colonies of the farm, forest or work camp type for inebriates. Mr. McCormick stated that the frequent failure of the splendid facilities for the treatment of alcoholism at Riker's Island in New York is due to the poor physical condition of the persons sent there, and to the short sentences imposed in an effort to reduce the prison population of the city. He considers at least one year, preferably a longer period, necessary to initiate rehabilitation. A substantial progress has been made in state and federal prisons, and an enlightened viewpoint prevails in many of them, where progressive officials talk of care and treatment instead of custody and punishment. How-

ever, this is not true of some county jails and local institutions.

The final session for the presentation of original papers was held on the afternoon of December 29, when the discussion of the social and legal problems of alcoholism was concluded. Dr. Horatio M. Pollock, of the New York Department of Mental Hygiene, discussed the social costs of alcoholism, reviewing available facts concerning the present day use of alcoholic beverages in the United States, and discussing the effect of such use on economic status, employment, crime, physical illness and mental disease. Some suggestions were offered relating to ways and means of lessening the unfavorable effects of alcohol.

Mrs. Harriet R. Mowrer, of Evanston, Illinois, spoke on "Alcoholism and the Family." Mrs. Mowrer stated:

Alcoholism is one of the many problems of personality adjustment which have their genesis in the complex of familial relationships out of which the patterns of personality are developed. The cultural background and economic adjustment are important in measuring the individual response to family organization. The alcoholic individual is characterized by shifting occupation, restlessness and lack of definite drive. There is a strong association between alcoholism and sexual factors. Marital discord is not the result of alcoholism but the result of the same etiologic factors. The alcoholic individual tends to enter marriage handicapped by some economic insecurity, dissatisfaction with occupational choice and a tendency to resort to substitute adjustment devices. The personality disorganization of the alcoholic patient can only be understood as it performs a function in the attempt at social adjustment by the individual.

"Alcohol is a Factor in Traffic Accidents" was discussed by Dr. Donald S. Berry, secretary, Committee on Tests for Intoxication, National Safety Council. He stated that about one third of all fatal traffic accidents involve a driver or a pedestrian under the influence of alcohol. The police have trouble in convicting obviously guilty drivers because the observed conditions may have been claimed to be due to illness, injury or medication. Chemical tests eliminate guesswork and have been used successfully in at least twenty-seven states. Dr. Berry recommended that they be more widely adopted.

Dr. Jeremiah P. Shalloo, of the University of Pennsylvania, speaking of the cultural factors involved in alcoholism, said:

It is culturally imperative to toast the bride, christen the ship, seal the bargain, speed the friend, salute the New Year, celebrate good fortune, wake the dead and even symbolize and ingest the blood of the Saviour through the medium of alcohol. With so many various forms of culturally approved drinking, the

amazing result is that we have so few persons emotionally dependent on alcohol in some form. The teetotaler is, after all, equally as abnormal from the cultural standpoint as is the habitual drinker. . . . Social habits which develop in response to cultural sanctions cannot be eliminated by sumptuary legislation.

Dr. Shalloo declared that the failure of prohibition was eloquent testimony of the essentially alcoholic nature of contemporary American culture. In conclusion, he pointed out the relation of the cultural background of an alcoholic individual to the form that his addiction may assume. That alcohol has been used throughout the ages does not lessen the need for the control and prevention of alcoholism in the twentieth century, he stated.

Dr. George S. Stevenson, of the National Committee for Mental Hygiene, gave the closing paper at this session. His subject was "Education and the Control of Alcoholism." Dr. Stevenson stressed the need of mental hygiene in colleges and educational institutions, "where alcoholism often begins." He spoke of the advantages that could be utilized generally by the dissemination and application of information such as a fact-finding organization might develop. In conclusion, Dr. Stevenson emphasized the value of preventive measures that might be applied to alcoholism.

After these papers had been read, discussion from the floor was invited. Among suggestions made was one from Dr. Leo Alexander, of Boston, which was indorsed by Drs. Merrill Moore and Abraham Myerson, of Boston, namely, that a great deal of the damage caused by alcoholism might be prevented if the provisions of the Food, Drug and Cosmetic Act of 1938 were applied to the advertising and sale of alcoholic beverages. Dr. Alexander stated:

Alcohol is both a food and a drug under the definitions of this act. The food section of this act intends . . . to protect the public from the sale of imitations under the name of the original product. If this provision were applied to alcoholic beverages, many of the so-called blended whiskeys would have to be sold under their correct name which is "imitation whiskey" or "freshly distilled grain alcohol with whiskey flavoring." There is no doubt that properly aged whiskeys are less injurious to health than freshly distilled grain alcohol. The act considers any food misbranded which is offered for sale in the name of another food or which is an imitation of another food, unless its label bears in type of uniform size and prominence the word "imitation," and, immediately thereafter, the name of the food imitated. The drug section of the act states that a drug is misbranded unless its label "bears adequate directions for use and such adequate warnings against use in those pathological conditions or by children, where its use may be dangerous to health, or

against unsafe dosage or methods or duration of administration or application, in such manner and form, as are necessary for the protection of users."

The following label, in conformity with the Food, Drug and Cosmetic Act of 1938, was proposed by Drs. Alexander, Moore and Myerson:

DIRECTIONS FOR USE: Use moderately and not on successive days. Eat well while drinking and, if necessary, supplement food by vitamin tablets while drinking. WARNING: May be habit-forming; not for use by children. If this beverage is indulged in immoderately, it may cause intoxication (drunkenness); later, neuralgia and paralysis (neuritis) and serious mental derangement, such as delirium tremens and other curable and incurable mental diseases, as well as kidney and liver damage.

Surgeon-General Thomas Parran, of the United States Public Health Service, presided at the final meeting, held during the evening of December 29, which was open to the public. He discussed the attitude of the federal government toward major health problems, and observed that it was not inconceivable that alcoholism might soon take its place beside those other disease conditions once thought uncontrollable but now better understood, such as tuberculosis, syphilis and cancer. Dr. Parran introduced Dr. Abraham Myerson, director of psychiatric research, Boston State Hospital, who made the principal address of the meeting. Dr. Myerson's subject was "The Social Pharmacology of Alcoholism." He stated that there is some danger that overemphasis may be laid in two directions in considering alcoholism. In the first place, the role of the vitamins should not obscure the fact that alcohol is in itself a narcotic drug and that it very probably has chronic effects that are independent of the role of the vitamins or, if not independent, of primary intrinsic importance. This also brings to light the fact that certain drugs have a useful role in the treatment of acute and chronic alcoholism, especially amphetamine sulfate, Metrazol and the combination of insulin and glucose.

The second overemphasis may be placed on the neurosis of the alcoholic patient. It is perfectly true that the person who becomes chronically addicted does so in response to social and emotional difficulty. Yet there are people in the population who do not become alcoholic, who have plenty of social and emotional difficulty, and who have a high incidence of other neuroses and psychoses. Dr. Myerson concluded:

It must be taken into account that the social attitude toward the drinking of alcohol is one of the most

important things in our civilization. Thus, alcohol is the drug used to enhance good fellowship and to evince gaiety and celebration as well as ceremony. In other words, to class it simply as a drug of escape or for the purpose of bringing about oblivion is only expressing one phase of its psychologic use. The other phase—celebration and ceremony—is of great value for us to understand. Moreover, the measure of personality worth has, to a certain extent and in large

segments of the population, become the ability to handle alcohol—in other words, to be able to drink large quantities. The whole attitude of society toward the use of alcohol and toward the alcoholic patient has become decidedly ambivalent. This total social pressure must be met by social means, social re education and social legislation, as perhaps the most important parts of the prevention of alcoholism.

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MEDICAL PROGRESS

THE ADRENAL CORTEX IN HEALTH AND DISEASE

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PHYSIOLOGIC AND CLINICAL EFFECTS

THE adrenal cortex, essential for life, has a large factor of safety. Only when it is largely depleted do signs of Addison's disease develop. Two chief manifestations of its functions then appear. First, a lavish excretion of urinary sodium chloride and water occurs, with a resulting reduction of the sodium chloride and water content as well as volume, of the blood plasma. There often appears a concomitant rise in plasma potassium. This effect on body electrolytes is the best known of the adrenocortical functions. Secondly, there is a tendency to hypoglycemia because of a close relation to carbohydrate metabolism.

But there are also obvious effects on the fatigue of muscles, on growth and sex and on resistance to various strains and stresses, such as infections or temperature changes. There is also a fall in the basal metabolic rate. The relation to pigment metabolism, with the striking discoloration that occurs in Addison's disease, is evident but not understood.

It is not too clear how the adrenal cortex accomplishes its control of plasma inorganic salt levels, but the work of Harrison and Darrow¹ implies that the kidney is at least one of the primary factors. These workers found that the normal kidney functions of tubular reabsorption of sodium when the blood sodium is low, and the increased excretion of potassium when the blood potassium is elevated are lost in dogs with adrenal insufficiency. In the latter deficiency, the decrease in plasma sodium does not arrest sodium excretion, and even though the blood volume has diminished, the urine volume remains elevated and its sodium content remains high. But though the blood plasma potassium rises under these conditions, it is only sluggishly excreted by the adrenal

deficient kidney. If sodium chloride is given to an animal with such an insufficiency, it produces a diuresis that sweeps out the sodium and some retained potassium as well, but the capacity to store sodium and to excrete a high concentration of potassium is restored only by treatment with cortical extract. This work was confirmed by Anderson et al.²⁻⁵ by means of radioactive salts; they found that animals could be kept practically normal if 1 per cent sodium chloride was added to their drinking water. They remained normal not only in their sodium and potassium levels but also in their ability to gain weight and to store glucose. It therefore appears that the inorganic disturbance produced by adrenal insufficiency bears some relation to the second function of the cortex—namely, carbohydrate metabolism.

The relation of the adrenal cortex to carbohydrate metabolism and its antagonism to insulin have been repeatedly investigated in the past by Britton and Silvette, Long and Lukens, and many others. There is still some disagreement about this relation, for Grollman⁶ thinks that the adrenal gland is not preeminently involved in the maintenance of normal carbohydrate metabolism. According to such investigators, the abnormalities observed represent only the poor condition of the adrenal-insufficient animal and not a function of the gland itself. On the contrary, other recent investigators again find a close fundamental relation between the adrenal glands and the carbohydrates. This viewpoint was primarily advanced by Britton and Silvette,⁷⁻⁹ Kitzin and Long⁹ described the effect of cortical extract as increasing the glycogen in the liver without affecting muscle glycogen. This observation has been confirmed by Sprague,¹⁰ who showed that the phenomenon occurred in both fasting normal and depauperized rats. The work has been strikingly summarized by Long, Kitzin and Fry,¹¹ who appear

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to demonstrate clearly the fundamental importance of this adrenal function. The cortical hormone, corticosterone, apparently decreases the proportion of glucose oxidized and increases its deposition. In depancreatized rats, adrenalectomy decreases and corticosterone increases glycosuria above the previous levels. This hormone raises the blood sugar of hypophysectomized rats even to "super-normal levels."

Thorn and his co-workers¹² have recently reported that "the ability of adrenalectomized animals to convert three carbon atom intermediate substances of carbohydrate and protein metabolism to glucose or glycogen is markedly impaired." They also noted an increased utilization of glucose by the adrenalectomized animal. These factors—poor formation but rapid use of glucose—account for the rapid exhaustion of the glycogen stores in fasting animals.

With these effects on carbohydrate metabolism Long and his associates¹¹ have also demonstrated an effect on protein metabolism, inasmuch as the cortical hormone stimulates nitrogen excretion. They suggest that increased gluconeogenesis from protein destruction may explain the elevated carbohydrate levels and the increased nitrogen and potassium excretions that result from the use of cortical extract in animals.

The loss of adrenal cortex thus appears to diminish the production of carbohydrate from protein breakdown, whereas the use of Kendall's Compound E or corticosterone produces a return to normal conditions. These were also the findings of Wells.¹³

An interesting clinical confirmation of this work is found in a diabetic patient who developed Addison's disease. Bloomfield¹⁴ reported that as Addison's disease developed the need for insulin fell markedly, and the use of desoxycorticosterone produced no obvious effect on carbohydrate metabolism; cortical extract was followed by a return of higher blood-sugar levels.

The most dramatic recent evidence for the importance of the adrenal gland to carbohydrate metabolism is the observation by Cope and his co-workers¹⁵ that in adrenocortical insufficiency in the dog there is a very marked rise in serum-amylase activity. They find that this change in activity is the most sensitive objective measurement in the blood of cortically insufficient dogs, for it becomes significantly elevated before any change in electrolyte substances can be observed. They also note that both adrenocortical extract and desoxycorticosterone acetate depress this elevated level. This is a very interesting early effect on circulatory enzymes that have to do with carbo-

hydrate catabolism, and it is surprising that the effect should be so prompt. The observation should be investigated in clinical cases of Addison's disease.

Many of these experimental abnormalities of carbohydrate metabolism can also be found in clinical cases with Addison's disease, as Thorn and his co-workers¹⁶ have well summarized. They discovered that a large proportion of patients showed striking hypoglycemia following glucose-tolerance tests or after various stresses like fever or fasting. There was a decreased threshold at which hypoglycemic symptoms appeared, and also little tendency to an elevated blood sugar with either the ingestion of glucose or the injection of adrenalin. These workers confirmed the specificity of certain adrenal compounds to correct these abnormalities, of which adrenocortical extract was most effective, though Compound E of Kendall and corticosterone were also satisfactory. An interesting finding was the persistence of carbohydrate abnormalities in patients by means of desoxycorticosterone acetate therapy, in spite of a return to normal in electrolyte balance, plasma volume and blood pressure. This is confirmed by Wilder,¹⁷ who found a persistent low blood-sugar level and a continued inability to withstand short periods of fasting.

The relation of the adrenal cortex to muscular fatigue has been studied in animals by Secker,¹⁸ who found that adrenalectomy was followed promptly by well-marked fatigue, which was relieved within a few minutes by the injection of adrenocortical extract. As Thomson and Collip¹⁹ point out, the surprising thing is the speed with which these changes occur.

McGavack²⁰ was intrigued by the small size of the heart in Addison's disease, a finding that has previously been noted at autopsy. He studied the reduction in heart volume and found this to be 32 per cent in 5 cases of Addison's crisis, and 16 per cent in 3 cases without crises. It was only during crises that he observed a significant reduction in blood volume, which plays an accessory role in further reducing the size of the heart. Two patients who were studied after adequate treatment demonstrated a return to a normal heart volume.

The relation of the adrenal cortex to sex development is clearly seen in the tumors of man. Adrenocortical hyperplasia or neoplasia produces precocious puberty in childhood, particularly toward the masculine sex, and causes a similar appearance of sex reversal in adult women. As described by Aub and Nathanson²¹ these changes are analogous to the effects of testosterone inasmuch as they affect the secondary sex character-

istics, such as the penis and clitoris, but do not influence the primary gonads, such as the testes. Gross²² has also described these patients. It is not surprising that such changes might occur because of the production of androgens in the adrenal gland. In a recent publication, Wolfe, Fieser and Friedgood²³ describe the isolation of several androgens from the urine of a girl with a malignant adrenal tumor. They isolated five ketosteroids in which the androgen-breakdown product, dehydroisoandrosterone, represented about a hundredfold increase above normal. Others²⁴ have likewise found excessive amounts of male hormones in the urine of adrenal virilism cases. The independent diagnostic value of determinations of urinary 17-ketosteroid excretion is limited to such cases.²⁵ Furthermore, several of the female sex hormones have been isolated from adrenal glands (such as estrone and progesterone) by Beall and Reichstein.²⁶⁻²⁸ Indeed, Callow, Callow and Emmens²⁵ conclude that 17-ketosteroids and androgens may be derived from both the gonads and the adrenal cortex, and suggest the hypothesis that absence of the gonads leads to compensatory activity of the adrenal cortex in their production.

A good summary of the clinical literature in regard to the sex factors of the adrenal gland has been made recently by Looney²⁹ and therefore does not need to be repeated. He concludes that "the weight of evidence at the present time indicates that the life-sustaining principle does not of itself affect the gonads, that certain cortical extracts have a marked effect on the sexual development of experimental animals, and that, therefore, there are present in the adrenal gland substances distinct from cortin which have gonadic activity."

There is one interesting and neglected fact about these cases of overactive adrenal glands, particularly in children. The effect may be a reversal of sex characteristics, as in girls and occasionally in men.³⁰ But in boys the effect is simply an early maturation of all secondary sex characteristics — the metamorphosis occurs quickly, but once it has been accomplished, no further progressive changes in the stimulated organs occur. In other words, the overactive adrenal gland is simply a maturing factor.

It must also be remembered that Cushing's syndrome may well be due to hyperfunction of the adrenal cortex. This large subject cannot be adequately handled here, but it has recently been well reviewed by Haymaker and Anderson.³¹

BIOCHEMISTRY

Chemical knowledge of the adrenal cortex has developed rapidly since the discovery, and syn-

thesis by Reichstein,³² of one of the active principles, corticosterone. Koch³³ has recently summarized the literature.

There are at least four well-known compounds (corticosterone, 11-dehydrocorticosterone, desoxycorticosterone and C, 17-hydroxydehydrocorticosterone); the last is Compound F of Wintersteiner and Pfaffner or Compound E of Kendall. An ester of desoxycorticosterone is the common form of synthetic compound now on the market. The cortical extract obtained from the adrenal glands probably contains a mixture of many such compounds.

Mason³⁴ states that more than twenty closely related crystalline substances have been isolated from the gland, and still "the major portion of the total activity of the crude extract remains in the mother liquors from which the crystalline fractions have been removed." This impure residue is fifteen times as potent as desoxycorticosterone and one hundred times that of corticosterone. The isolated substances are all four-ringed compounds of the group called steroids (like sterol), and are closely related chemically to all the sex hormones. In fact, it is highly likely that estrogens, androgens and progesterone are synthesized in the adrenal glands as well as in the sex glands.

It is very interesting that compounds so closely related chemically should have such divergent effects. In some compounds a mixture of effects may be seen. Thus Mason³⁴ states that desoxycorticosterone acetate has progestational activity. The marked changes in growth and function and in body configuration produced by the sex hormones, compared with the metabolic effects of the very closely related adrenal steroids, give as dramatic a picture of the effects of very small chemical changes as can be found. The only difference between desoxycorticosterone and testosterone is that the former has a short ester chain replacing an oxygen atom, — yet it influences salt metabolism to a degree that represents health or death and has no androgenic effect, — whereas testosterone shortens the duration of the life of an adrenalectomized animal, but produces the changes in the body commonly ascribed to maleness. No chapter in chemistry is more interesting than this recent development.

The various isolated compounds, although closely related, have different therapeutic effects on the adrenal-insufficient organism. Thus some are not active, whereas desoxycorticosterone, which has few oxygen atoms, is the most effective compound in combating the sodium chloride loss produced by deficiency. It has, however, but feeble effect in correcting the carbohydrate abnormality of

metabolism.¹⁶ On the contrary, the closely related Compound E of Kendall apparently has an effect on the carbohydrate metabolism and on the fatigue phenomenon of muscle and a very weak salt-correcting quality, and corticosterone has some effect on both elements of metabolism.²¹

This great difference in effect may well account for the better responses sometimes produced by an extract of the adrenal gland rather than the therapeutic effects produced by single synthetic compounds. The impure extract isolated from the gland tissue represents a mixture of the compounds that are sometimes needed in therapy. This problem of the specificity of effects is well summarized by Kendall,³⁵ who has done much work in this field.

The administration of adrenal extracts may produce atrophy of the adrenal glands. Wells and Kendall³⁶ report that this is produced by corticosterone and Compound E, but not by desoxycorticosterone acetate. This is fortunate, for the compound most widely used in therapy is therefore least deleterious to the remaining adrenal tissue. It is interesting that Clausen³⁷ has recently reported that a similar atrophy may follow injections of progesterone.

Synthetic hormones do not produce such a refractory state with repeated injections as may develop from extracts of the adrenal glands. Hartman's³⁸ evidence indicates that refractoriness to the sodium factor in cortical extracts is due to an immunity that develops in adrenalectomized animals as easily as in normal animals. The pseudoglobulin fraction of the blood serum is responsible for the refractory state, which does not develop from extracts made from the same species as the subject. Because of this phenomenon Hartman advises against intravenous use of cortical extracts.

TREATMENT OF ADRENAL DEFICIENCIES

The treatment of Addison's disease has been well summarized by Loeb and his associates³⁹ and also by Thorn.^{40, 41} The specific treatment consists in using the most effective of the synthetic adrenocortical hormones, desoxycorticosterone acetate. This is not a perfect form of therapy, for it controls the salt loss but does not influence the abnormal carbohydrate metabolism of the disease. It would be better in the present state of knowledge to use the corticosteroids derived from the adrenal glands themselves, for this would give a more balanced mixture of the group of elaborated chemicals. But the use of such glandular extracts lacks uniformity of effect, and is very expensive. Its lack of dependability and the immunity that

may follow its use are, of course, serious matters in a disease in which crises may be of grave prognosis.

Desoxycorticosterone acetate can be used in three ways: First, by mouth, when very large quantities of this expensive drug are required. This method is also not desirable when gastrointestinal upsets are present, for absorption rates may be depressed at just the time when the therapy is most needed. The successful therapeutic use of desoxycorticosterone acetate, by applying it under the tongue, has been described by Anderson, Haymaker and Henderson⁴²; when the drug was dissolved in propylene glycol, the absorption appeared adequate and as effective as when it was given in oil intramuscularly. The usual method of administration is the intramuscular use in oil. This is usually a very satisfactory technic requiring at least several injections a week but with a fairly steady absorption rate. Finally, insertion as a solid pellet subcutaneously, an ingenious technic developed by Thorn,⁴⁰ has several advantages inasmuch as pellets have to be inserted only every few months, the absorption rate appears constant, and the amount of compound needed is relatively low. Once the diagnosis is clear and the constant need for the drug established, this appears the treatment of choice.

It is clear that desoxycorticosterone acetate should be first given intramuscularly in oil to establish whether it produces beneficial effects and how much is needed. Thorn recommends giving 6 to 8 gm. of added sodium chloride a day by mouth, and daily injections of 2 to 5 mg. of the drug. The patient ought to gain weight at once, for there should be a storage of sodium, chloride and water in the extracellular fluids. But a gain of more than a pound a day during the first week or a half pound subsequently means that too much of the hormone or too much salt is being given.

Wilder¹⁷ recently discussed the treatment of Addison's disease in a large number of patients at the Mayo Clinic. A low-potassium diet—a previous scientific contribution of the clinic⁴³—appeared to improve the clinical condition of the patients. The introduction of desoxycorticosterone acetate,⁴⁴ however, further improved the therapeutic results, although investigation soon revealed hypertensive blood pressures, increased venous pressure, peripheral edema and deaths from acute heart failure. Restricting the amount of salt added to the diet and discontinuing the reduction of potassium have appeared to remedy this problem in therapy. It is, of course, clear that an excess of desoxycorticosterone must not be given, for it may produce such an increased blood volume as to elevate the venous

pressure considerably. This may account for the cardiac failures. It is possible that the low-potassium diets accentuate this.⁴⁵

McGavack⁴⁶ stresses further the serious cardiac damage in Addison's disease that may follow an excessive intake of salt or adrenocortical hormone, as well as a marked reduction of potassium intake. Overtreatment, which may result in cardiac-muscle weakness, anasarca and hypertension, can easily be avoided now that it is recognized. McGavack also suggests that an ample intake of vitamin B may prevent the appearance of cardiac failure.

The treatment of the crises not infrequently seen in Addison's disease requires particular care. Not only is the synthetic drug, desoxycorticosterone acetate, badly needed in doses of about 25 to 35 mg., but the use of the aqueous gland extract is also desirable. But to these must be added warmth and careful intravenous therapy with saline and glucose solutions. A normal blood-sugar level must be maintained, as well as an elevated blood-sodium level. This phase of treatment is well described in the article by Thorn and Fitor.⁴⁰

Once the crisis is over and daily maintenance doses are established, the problem of pellet implantation should be considered. Thorn recommends "one pellet of from 100 to 150 mg being used for each 0.4 to 0.5 mg. of the material necessary for maintenance."

OTHER USES FOR CORTICAL HORMONES

Lindsay and his co-workers⁴⁷ urged the use of desoxycorticosterone as treatment for the Waterhouse-Friderichsen syndrome, the bilateral adrenal apoplexy of childhood. When such a diagnosis can be made, this therapy certainly deserves a thorough trial.

Perla and Marmorston⁴⁸ suggest that cortical hormone, with adequate salt and water in the diet, is of value in "maintaining patients with severe infections," such as pneumonia.

The analogy between adrenal insufficiency and traumatic shock was first suggested by Swingle et al.⁴⁹ The idea was not generally accepted, but recently has received more attention; several investigators have tried with some success the use of cortical extract, or desoxycorticosterone, in preventing or combating traumatic shock.⁵⁰⁻⁵¹ This is an interesting idea, which might be of particular importance in these days of war. There is a possibility that the hormone might produce salt storage in the body, and a little evidence that this would stay in the circulation, from Ragan, Ferrebee and Fish⁵⁰ Selye, and Dosne et al.^{61, 62} believe that cortical extract is better than desoxycorticosterone acetate, and Swingle and his associates^{55, 56}

imply that the action suggests a direct effect on the tonus of the peripheral circulation rather than on the electrolytes or carbohydrate metabolism. Most of these studies deal with the prevention of shock rather than its cure, and further investigations are needed before this work can be considered worthy of use in clinical cases.

* * *

The last few years, therefore, have seen a transformation in the conception of the adrenal gland. Its functions are fairly well understood, its active secretions not only isolated but capable of synthesis in the laboratory, and its treatment improved to a point where many patients can return from invalidism to prolonged active life.

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REFERENCES

- 1 Harrison H E and Garrow O C Renal function in experimental adrenal insufficiency *Am J Physiol* 125 631 643 1939
- 2 Garrow O C, Harrison H E and Taffel M Tissue electrolytes in adrenal insufficiency *J Biol Chem* 130 487 502, 1939
- 3 Anderson E and Joseph M Urinary excretion of radioactive Na and K in adrenalecтомized rats, with and without salt *Proc Soc Exper Biol & Med* 40:347 350 1939
- 4 Anderson E, Joseph M and Herring V Changes in excretion of radioactive Na, K and in carbohydrate stores twenty four hours following adrenalectomy *Proc Soc Exper Biol & Med* 42:782 785 1939
- 5 Anderson E and Herring V V Effect of NaCl and desoxycorticosterone on body weight and carbohydrate stores of adrenalecтомized rats *Proc Soc Exper Biol & Med* 43 363 366 1940
- 6 Grollman A The relation of the adrenal cortex to carbohydrate metabolism *Am J Physiol* 122 460 471 1938
- 7 Birtton S W and Silvette H The apparent peripheral function of the adrenal glands *Am J Physiol* 100 701 713 1932
- 8 Idem The adrenal cortex and carbohydrate metabolism *Cold Spring Harbor Symposium on Quant Biol* 5 357 359 1937
- 9 Katzin B and Long C N H The effect of the adrenal cortical hormone on the liver and muscle glycogen in normal fasting mice and rats *Am J Physiol* 123 113 118 1938
- 10 Sprague R G The influence of extract of the adrenal cortex on glycogenesis in fasting rats *Proc Staff Meet, Mayo Clin* 15 291 294 1940
- 11 Long C N H, Katzin B and Fry E G The adrenal cortex and carbohydrate metabolism *Endocrinology* 26 309 344 1940
- 12 Lewis R A, Kuhlman D, Delbue C, Koepf, G F and Thorn, G W The effect of the adrenal cortex on carbohydrate metabolism *Endocrinology* 27 911 987 1940
- 13 Wells B B The influence of crystalline compounds separated from the adrenal cortex on glucocorticogenesis *Proc Staff Meet, Mayo Clin* 15 294 297 1940
- 14 Bloomfield, A L The coincidence of diabetes mellitus and Addison's disease *Bull Johns Hopkins Hosp* 65:456-465 1939
- 15 Cope O, Kapnick T, Lambert, A, Pruitt, T, D and Verlor M G Endocrine function and amylase activity II Changes in activity of blood serum amylase in response to changes in adrenal cortical function in the dog and rabbit *Endocrinology* 25 236-247, 1939
- 16 Thorn G W, Koepf, G F, Lewis R A and Olsen, E F Carbohydrate metabolism in Addison's disease *J Clin Investigation* 19 813 832 1940
- 17 Wilder, R M Progress in treatment of Addison's disease *Proc Staff Meet, Mayo Clin* 15:273 277, 1940
- 18 Secker, J Suprarenals and transmission of activity of sympathetic nerves of rat *J Physiol* 94 259 279, 1938
- 19 Secker, J Suprarenals and transmission of activity of sympathetic nerves of rat *J Physiol* 95 282 285 1939
- 20 Thomson O L and Collip J B Endocrine glands *Ann Rev Physiol* 2 309 346, 1940
- 21 McGavack, T H Changes in heart volume in Addison's disease and their significance *Am Heart J* 21:116 1941
- 22 Aub, J C and Hathaway, V T The value of sex hormone assays in differential diagnosis of puberty *Tr A Am Physicians* 55:306 1940
- 23 Gross R E Neoplasms producing endocrine disturbances in childhood *Am J Dis Child* 59 5 9 618 1940
- 24 Wolfe J A, Feuer L F and Friedgood H R Nature of the androgens in female adrenal tumor urine *J Am Chem Soc* 64 582 593, 1942
- 25 Burrows 21, Cook, J W, Roe E M F and Warren, F L Isolation of Δ^4 -androsta-17-one from urine of man with malignant tumor of adrenal cortex *Biochem J* 31 950 961, 1937
- 26 Callow, N H, Callow R K and Emments C V 17 ketosteroid androgen and oestrogen excretion in the urine of cases of gonadal or adrenal deficiency *J Endocrinol* 2 55 98 1940

26. Beall, D. and Reichstein, T. Isolation of progesterone and allopregnanolone from adrenal. *Nature, London* 142:479, 1938.
27. Beall, D. Isolation of progesterone and 3:20-allopregnanolone from ox adrenals. *Biochem. J.* 32:1957-1960, 1938.
28. *Idem*: Isolation of oestrone from adrenal gland. *Nature, London* 144:76, 1939.
29. Looney, J. M. Sex factors of the adrenal gland. *Endocrinology* 27:511-520, 1940.
30. Lissner, H. A case of adrenal cortical tumor in an adult male causing gynecomastia and lactation. *Endocrinology* 20:567-569, 1936.
31. Haymaker, W. and Anderson, E. The syndrome arising from hyperfunction of the adrenal cortex: adrenogenital and Cushing's syndromes — review. *Internat. Clin.* 4:244-299, 1938.
32. Reichstein, T. Cortin, the adrenal cortical hormone. *Helvet. chim. acta* 19:29-63, 1936. Constituents of the adrenal cortex. II. Andrenosterone. *Ibid.* 19:223-225, 1936. Constituents of the adrenal cortex. X. Corticosterone. *Ibid.* 20:953-969, 1937. Constituents of the adrenal cortex. XI. Constitution of the $C_{21}O_6$ group. *Ibid.* 20:978-991, 1937. Reichstein, T. and Goldschmidt, A. Constituents of the adrenal cortex. III. The sulfur containing compound. *Ibid.* 19:401, 1936.
33. Koch, F. C. Hormones: suprarenal cortex. *Ann. Rev. Biochem.* 9:334-337, 1940.
34. Mason, H. L. The chemical nature of the hormones of the adrenal cortex. *Proc. Staff Meet., Mayo Clin.* 15:289-291, 1940.
35. Kendall, E. C. The function of the adrenal cortex. *Proc. Staff Meet., Mayo Clin.* 15:297-304, 1940.
36. Wells, B. B. and Kendall, E. C. Qualitative difference in effect of compounds separated from adrenal cortex on distribution of electrolytes and on atrophy of adrenal and thymus glands of rats. *Proc. Staff Meet., Mayo Clin.* 15:133-139, 1940.
37. Clausen, H. J. The atrophy of the adrenal cortex following the administration of large amounts of progesterone. *Endocrinology* 27:989-993, 1940.
38. Hartman, F. A., Lewis, L. A. and Gabriel, J. E. Further studies on the refractory state developed following repeated injections of adrenal extract. *Endocrinology* 26:879-885, 1940.
39. Ferrebee, J. W., Ragan, C., Atchley, D. W. and Loeb, R. F. Desoxycorticosterone esters: certain effects in the treatment of Addison's disease. *J. A. M. A.* 113:1725-1731, 1939.
40. Thorn, G. W. and Firor, W. M. Desoxycorticosterone acetate therapy in Addison's disease. *J. A. M. A.* 114:2517-2525, 1940.
41. Thorn, G. W. Treatment of Addison's disease. *J. Clin. Endocrinol.* 1:76-81, 1941.
42. Anderson, E., Haymaker, W. and Henderson, E. Successful sublingual therapy in Addison's disease. *J. A. M. A.* 115:2167, 1940.
43. Allers, W. T., Nilson, H. W. and Kendall, E. C. Studies on adrenalectomized dogs: the toxic action of potassium. *Proc. Staff Meet., Mayo Clin.* 11:283-288, 1936.
44. Steiges, M. and Reichstein, T. Desoxycorticosterone aus Δ^2 -3-Oxy- Δ^4 -cholensäure. *Helvet. chim. acta* 20:1164-1179, 1937.
45. Tooke, T. B., Jr., Power, M. H. and Kepler, E. J. Tolerance of patients suffering from Addison's disease to potassium while such patients are being treated with a desoxycorticosterone acetate. *Proc. Staff Meet., Mayo Clin.* 15:365-368, 1940.
46. McGavack, T. H. Adrenal insufficiency: some pitfalls in the treatment of Addison's disease. *J. Clin. Endocrinol.* 1:68-75, 1941.
47. Lindsay, J. W., Rice, E. C., Selinger, M. A. and Robins, L. The Waterhouse-Friderichsen syndrome: acute bilateral suprarenal hemorrhage. *Am. J. M. Sc.* 201:263-270, 1941.
48. Perla, D. and Marmorston, J. Suprarenal cortical hormone and salt in the treatment of pneumonia and other severe infections. *Endocrinology* 27:367-374, 1940.
49. Swingle, W. W., Pfaffner, J. J., Vars, H. M., Bott, P. A. and Parkins, W. M. The function of the adrenal cortical hormone and the cause of death from adrenal insufficiency. *Science* 77:58-64, 1933.
50. Ragan, C., Ferrebee, J. W. and Fish, G. W. Effect of desoxycorticosterone acetate upon plasma volume in patients during ether anesthesia and surgical operation. *Proc. Soc. Exper. Biol. & Med.* 42:711-716, 1939.
51. Selye, H. and Dosne, C. Treatment of wound shock with corticosterone. *Lancet* 2:70, 1940.
52. Selye, H., Dosne, C., Bassett, L. and Whittaker, J. On the therapeutic value of adrenal cortical hormones in traumatic shock and allied conditions. *Canad. M. A. J.* 43:1-8, 1940.
53. Perla, D., Freiman, D. G., Sandberg, M. and Greenberg, S. S. Prevention of histamine and surgical shock by cortical hormone (desoxycorticosterone acetate and cortin) and saline. *Proc. Soc. Exper. Biol. & Med.* 43:397-404, 1940.
54. Pollak, H. Wound shock and suprarenal cortex. *Lancet* 1:574, 1940.
55. Swingle, W. W., Parkins, W. M., Taylor, A. R. and Hays, H. W. Study of circulatory failure and shock following trauma to the healthy, vigorous adrenalectomized dog. *Am. J. Physiol.* 124:22-29, 1938.
56. Swingle, W. W., Hays, H. W., Remington, J. W., Collings, W. D. and Parkins, W. M. The effect of priming doses of desoxycorticosterone acetate in preventing circulatory failure and shock in the adrenalectomized dog. *Am. J. Physiol.* 132:249-258, 1941.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27201

PRESENTATION OF CASE

A sixty-two year-old man entered the hospital for study.

Because of the patient's condition the history was obtained from his physician's letter and the nurse's report. It appeared that the patient had been well until two months before admission, when he complained of "fuzziness in the head" and inability to concentrate. One month before entry, a short period of aphasia developed, but neurologic examination was otherwise negative and the blood pressure was 144 systolic, 96 diastolic. He remained in bed for three weeks, but failed to regain his strength, fell in attempting to walk, and became increasingly quarrelsome, irritable and irrational, with incontinence and episodes of stupor. Neurologic examination was still negative apart from exaggerated knee jerks, and a lumbar puncture was entirely normal except for an increased globulin content; blood studies and serologic tests were normal. Three weeks before admission, transient aphasia again appeared, and the patient was unable to stand without support. The periods of stupor became more frequent and prolonged, his conduct varying between smiles of apparent recognition, and irrationality and semiconsciousness. At times the patient refused nourishment, becoming noisy and uncontrollable; again, he would lie groining and unresponsive. The temperature swung between 101 and 105°F, he developed a cough without sputum, and on one occasion vomited "coffee grounds with mucus." During the journey to the hospital the patient was very drowsy and at one point developed a marked, transitory respiratory difficulty with cyanosis.

The patient had suffered from typhoid fever fifteen years before admission, and two years before admission his physician had recorded a blood pressure of 184 systolic, 122 diastolic, but at that time he appeared perfectly well. For ten years he had had occasional severe headaches, but had not complained of headache during the present illness. His family was noted for longevity, both the mother and father having died between ninety-five and a hundred of hypertension with cerebral manifestations.

On examination the patient was semicomatose,

restless, moaned occasionally and withdrew his extremities from painful stimuli. His emotions ranged from wild laughter to tears. The pupils were of average size, equal and reacted to light. The retinal vessels and optic disks appeared normal. There was no facial weakness, the neck was rigid (a sign that the nurse had not noticed until their arrival at the hospital). Flexor and extensor tone was increased in the right arm, and the right knee and ankle jerks were more active than those on the left. Sustained ankle clonus was present on the right, with four to five clonic jerks on the left. The plantar reflex on the right was equivocal; on the left it was normal.

In general, the patient was dehydrated, with loose skin, dry mouth and coated tongue; there was a thick ropy posterior pharyngeal discharge. The heart, lungs and abdomen were essentially normal; the blood pressure was 135 systolic, 95 diastolic.

The temperature was 100.5°F, the pulse 100, and the respirations 25.

The urine was normal. The blood showed a red cell count of 4,830,000 with a hemoglobin of 14.5 gm (photoelectric cell technic), and a white-cell count of 13,100 with 92 per cent polymorphonuclears. The nonprotein nitrogen of the blood serum was 28 mg, the sugar 118 mg per 100 cc, the blood Hinton reaction was negative.

A lumbar puncture gave an initial pressure of 160 mm of spinal fluid. The fluid contained 2 cells per cubic millimeter, and the total protein was 60 mg, the sugar 127 mg and the chlorides 727 mg per 100 cc. A gold sol curve was 0001100000, the Wassermann reaction negative.

X-ray films of the skull showed an area of calcification measuring 4 by 3 by 2 cm. in the left posterior parietal region close to the mid line. This shadow was made up of small circular shadows having the appearance of calcification in blood vessels. The pineal body was not displaced in the lateral views and was not visible in the anteroposterior views. The sella turcica was normal in size and shape, and the bones of the vault appeared normal.

An x-ray examination of the chest was negative.

An electroencephalogram showed abnormal, 3 per-second waves, chiefly on the right side, with most of the slow-wave activity in the right posteroparietal region.

On the fifth hospital day, an operation was performed.

DIFFERENTIAL DIAGNOSIS

Dr. Augustus S. Rose. We can be certain that we are dealing with a patient whose symptoms came from the brain, and that the data are suffi-

cient to permit us to say that the lesion was on the left side. Therefore our differential diagnosis must consider those unilateral lesions which might produce this history and these physical findings. In my differential diagnosis I shall include some infectious process of the brain, dural sinuses or subdural spaces, cerebrovascular disease, subdural hematoma and tumor.

While Dr. Holmes looks over the x-ray films we can briefly review the history. Stripped of the nonessential data, we are dealing with a sixty-two-year-old man with a history of headaches for ten years, who had a period of one month of vague cerebral symptoms followed by a month of progressive signs and symptoms. These were intermittent aphasia, variable consciousness, irrationality, stupor and fever. On physical examination there were coma, dehydration, stiff neck, normal pupils and optic disks, and increased reflexes on the right side, with some increased tone. A slight fever, a moderate increase in the white-cell count and negative serologic tests were also recorded. Lumbar puncture showed a normal pressure and only slight elevation in protein. The skull x-ray film gives an important lead.

DR. GEORGE W. HOLMES: The lesion described can be quite distinctly seen by those of us who are close. It does have very much the appearance of calcification in the walls of blood vessels. It is a little far back and a little high, I think, for the choroid plexus, although it does not look unlike that.

DR. ROSE: Should you say it is in the substance of the brain or on its surface?

DR. HOLMES: I should think it is in the substance of the brain, or in a dilated ventricle.

DR. ROSE: It is not consistent with calcification in a blood clot such as an old hematoma?

DR. HOLMES: No; furthermore, I think that is very rare.

DR. ROSE: There is no evidence of increased pressure?

DR. HOLMES: No.

DR. ROSE: I do not dare ask you whether you think it is a tumor.

DR. HOLMES: It would not do you much good because I could not answer it.

DR. ROSE: First, of the conditions mentioned, an infectious process, such as brain abscess, meningitis, thrombophlebitis of one of the dural sinuses or subdural abscess, can be most easily ruled out. Indeed, the question of infection is raised only because of fever, increased white-cell count and stiff neck. There is no history of an antecedent infection that might have served as a source of an intracranial infection. The duration and the character of the symptoms, the normal cerebrospinal-

fluid pressure and the absence of cells in the spinal fluid are all conclusively against the diagnosis of an infection. The fever and elevated white-cell count may be explained by dehydration, although some other factor is necessary to explain the temperature of 105°F. The stiff neck is also a troublesome matter. In the absence of infection, rigidity of the neck is a sign not infrequently seen in posterior-fossa tumor, but when present is usually associated with increased pressure, and is explained by irritation of the tentorium. In this case, there is neither increased pressure nor evidence for a subtentorial tumor. Possibly it was produced by irritation from above.

Cerebrovascular disease is a "wastebasket" into which this case could easily be placed if we did not carefully consider the nature of the symptoms. By cerebrovascular disease, I imply arteriosclerosis and thrombosis, which are here suggested by the patient's age, blood pressure, intermittent symptoms and relatively normal cerebrospinal fluid. But variable coma, a relatively rapid course and the absence of paralysis or even weakness, although aphasia was present, are strongly opposed to cerebrovascular thrombosis as the primary disease. Furthermore, the x-ray film gives evidence of a lesion, which we must assume is associated with the primary disease, and which must have been present long before the onset of symptoms. We may therefore safely rule out cerebrovascular disease.

Except for the intracerebral calcification and lack of a history of a head injury, we have in this case an almost perfect picture for subdural hematoma; that is, an elderly man with frequent headaches who develops confusion and irrationality followed by stupor and coma. The physical examination shows fewer signs than would be expected from the severe clinical reaction, and although the symptoms suggest increased intracranial pressure, it is not found. These are features commonly associated with chronic subdural hematoma. However, in a case of a hematoma producing symptoms of this severity there should be evidence of pressure, and one might also expect a dilated pupil on one side from compression of the third nerve. But again the x-ray evidence points to a deep intracerebral lesion and is the deciding factor in excluding conditions other than tumor as the primary cause of symptoms.

Having arrived at tumor as the best diagnosis we are left with the question of the type of tumor. This is a difficult question, for it is necessary to find a tumor that grows slowly and yet causes severe symptoms without producing increased pressure. Only the slowly growing tumors contain calcium. The slowly growing tumor as a

rule does not cause coma without pressure. The calcification, as described, is made up of circular shadows. This raises the question of hemangioma. However, a hemangioma would have been present for many years and these symptoms could be produced only by bleeding and we have no evidence for hemorrhage. The location and type of symptoms and the absence of pressure, as well as the x-ray appearance, are against meningioma. Gliomas that produce calcification are the oligodendrocytoma and the astrocytoma. Both may grow slowly. The former is usually very heavily calcified and first causes local symptoms, then pressure. An astrocytoma may contain irregularly placed calcium deposits and infiltrate widely. Therefore, although the x-ray appearance is not what I should expect, I make astrocytoma my first choice.

DR. WILLIAM B. BREED: I am interested in the electroencephalogram, about which I know little or nothing. But according to this report the abnormality is placed on the right side. Is this important? Should we pay any attention to it? Everything else points to the left side.

DR. ROSE: That is why I ignored it.

DR. BREED: Should we continue to ignore the electroencephalogram?

DR. ROSE: In general, I do not believe we have yet acquired sufficient knowledge to interpret the electroencephalogram accurately and adequately.

DR. W. JASON MIXTER: A large posterior left-sided occipitoparietal bone flap was turned down. The dura was reflected upward. The brain appeared somewhat atrophied. There were lakes of spinal fluid around the arachnoid. The vessels were engorged, and many of the arteries, which were large and tortuous, were markedly sclerotic. No mass could be felt anywhere. A ventricular needle was inserted through the cortex pointing toward the location of the mass as shown by x-ray study. The mass was encountered, and then the needle slipped forward into the ventricle. Brownish-yellow fluid was withdrawn at first, and later clear ventricular fluid. It was evident that the ventricle was considerably dilated. An opening was made in the anterior part of the occipital lobe over the site of the exposed mass, and dissection of brain tissue by diathermy was carried down until the ventricle was entered, the funnel being about 3 cm. across on the surface. The ventricle itself seemed normal except for dilatation, and the choroid plexus seemed normal. In the medial portion of the roof of the ventricle could be felt a very hard, irregular mass running forward for about 5 cm., apparently about 2 cm. in width. This was exposed by incising the white matter

about the ventricle. There was very free bleeding about the tumor from moderate-sized arteries and veins. The tumor seemed to be composed of grayish-purple tissue in which large calcified vessels were running. The posterior third was dissected out with considerable difficulty. Bleeding points were controlled with clips and diathermy. After consultation with Dr. Kubik, it was believed that the mass was irremovable in its entirety. The opening into the ventricle was left wide open and the dura closed with interrupted silk sutures. The postoperative diagnosis was probable hemangioma.

DR. CHARLES S. KUBIK: That was the preoperative diagnosis too?

DR. MIXTER: Yes, based entirely on the x-ray findings.

CLINICAL DIAGNOSIS

Left parieto-occipital tumor, probably a hemangioma.

DR. ROSE'S DIAGNOSIS

Astrocytoma, left parieto-occipital region.

ANATOMICAL DIAGNOSES

Hemangioma of the left parietal lobe.
Subdural hematoma, postoperative.
Bronchopneumonia.

PATHOLOGICAL DISCUSSION

DR. KUBIK: The patient died of bronchopneumonia on about the twelfth postoperative day. A hemangioma in the left upper posterior parietal region and also a left subdural hematoma were found at autopsy. I believe the subdural hematoma was postoperative. The membrane was very friable and would, I think, be consistent with a twelve-day affair.

DR. MIXTER: There was no evidence of it at the time of operation. We had a fair exposure of the hemisphere.

DR. KUBIK: The tumor, measuring from 2.5 to 4 cm. in diameter, was on the medial surface in the posteroparietal region of the left hemisphere above and to the inner side of the lateral ventricle. On the surface were innumerable blood vessels like a mass of small fishworms, and leading into the mass were the anterior cerebral and posterior cerebral arteries, both of which were greatly dilated on the side of the tumor while on the other side they were normal. Between the tumor and the superior longitudinal sinus there was a plexus of small vessels that emptied, through a large sinus, into the superior longitudinal sinus, and also what appeared to be arterial branches connecting directly with the superior longitudinal

sinus. These lesions are probably not true neoplasms but developmental anomalies, and may perhaps be first cousins to congenital arteriovenous anastomoses, of which we had an example several years ago. In that case, there were numerous communications between arteries and veins, with tortuosities that never amounted to masses like the one in this case but approached that condition in some places.

DR. ROSE: Was there any evidence of recent hemorrhage?

DR. KUBIK: I did not find any. That is a curious thing about the case. Why did the patient have symptoms if there had been no recent bleeding? The clinical picture was more consistent with the subdural hematoma.

DR. MIXTER: Is it not true that there was a good deal of clotted blood inside these vessels, probably from thrombosis within the tumor?

DR. KUBIK: Yes. It is rather interesting, too, that although this patient had had severe headaches for ten years, which I suppose were related to the hemangioma, he had no headache preceding entry to the hospital.

DR. ROSE: At least he did not talk about it, or could not.

DR. KUBIK: That was the history given by his nurse and by his family physician.

CASE 27202

PRESENTATION OF CASE

First Admission. A fifty-year-old divorced shoemaker was admitted to the hospital complaining of pains in his stomach of two years' duration.

The patient said that he always had been strong and healthy before his present illness. Four or five years before admission, he noted that the ingestion of cold food such as ice cream or ice water immediately precipitated vomiting, the vomitus consisting of recently eaten food and occasionally of coffee-grounds material. There had never been any bright blood. Only cold food had this effect. Gradually these vomiting episodes were preceded by a griping, squeezing pain, which began fairly low in the abdomen and radiated upward to "press on my heart." The patient noted that the pains were worse when associated with hunger, and that they were markedly relieved by the ingestion of warm food. At times these stomach pains disappeared for two or three days, but they then recurred. He was frequently awakened from a sound sleep by pains that caused him to double up; these pains, unassociated with the ingestion of cold food, were described as being griping in character. After a few minutes, the pain disappeared.

The patient also noted gaseous and acid eructations and constipation, but no abnormal stools. He had never had jaundice or hemorrhoids. Four years before admission he weighed 185 pounds, three years later, 155 to 160 pounds, and at the time of admission, 147 pounds. Because of the pain, which had become constant, and because of increasing weakness, he finally had to give up work two months before admission.

The past and family histories were noncontributory except for the occurrence of pneumonia ten years before entry, with complete recovery, and an episode thirty years previously, while the patient was in the Russian army, characterized by chills and fever of two months' duration, which was apparently cured by the frequent ingestion of quinine. He had suffered the usual childhood diseases.

Physical examination revealed a well-developed but somewhat emaciated and markedly anemic man lying quietly in bed in no apparent distress. Examination of the heart was negative. The blood pressure was 130 systolic, 75 diastolic. The lungs were clear. The abdomen was slightly tender on pressure in the right upper quadrant and right mid-epigastrium. No masses or spasm was noted. Rectal examination revealed a firm, slightly enlarged prostate.

Examination of the urine was negative. Examination of the blood showed a red-cell count of 4,000,000 with 60 per cent hemoglobin.

X-ray examination revealed a mottled, irregular filling defect involving the mid-portion of the stomach and extending up toward the cardia and down toward the pyloric end. The walls of the stomach in this region were rigid, and peristalsis was absent. There was no retention of the six-hour meal. The first portion of the duodenum was normal in contour and in the usual position. The six-hour meal had reached the transverse colon.

On the fifth day, a partial gastrectomy was performed. The pathologic report was adenomatous polyp. The patient developed an infected wound, which had to be drained. Six days after operation, he began to vomit and visible peristalsis appeared. Gastric lavage was done twice, and on both occasions there was a large amount of dirty material in the stomach. Because of the apparent intestinal obstruction, he was again operated on and lysis of adhesions was performed. He improved steadily and was discharged on the twenty-first hospital day.

Second Admission (thirteen years later). The patient had been well since his discharge and was followed in the gastrointestinal and tumor clinics.

Four months before the present admission, he began to have sharp pains located in the left lower quadrant and radiating up to the sternum and lateral borders of the ribs and around to the back. These pains occurred while he was ingesting food but one month before admission they became constant and localized in the epigastric region. His appetite remained good, but he noted increasing discomfort at the time of eating. He lost 5 or 6 pounds in four months. He had noted some increase in weakness. For the past two or three years before the second admission, the patient noted nocturia four or five times and increasing difficulty in starting the urinary stream. He had no other complaints.

Physical examination showed a thin patient, with a loose inelastic skin. His teeth were poor. There were several firm, movable, nontender shotty lymph nodes in the right axilla. The peripheral vessels were tortuous and sclerotic. Examination of the abdomen revealed a right upper pararectal scar and a midline upper abdominal scar, in the center of which was a small incisional hernia. There was tenderness without spasm in the left upper abdomen. There was very slight pitting edema of the right ankle.

The urine examination was negative. Examination of the blood showed a red cell count of 3,400,000 with 55 per cent hemoglobin. The stools were dark brown and formed, and showed a ++ guaiac reaction. The serum nonprotein nitrogen was 23 mg per 100 cc, the serum chloride 99.8 milliequiv and the carbon dioxide combining power 29.8 milliequiv per liter, and the serum protein 5.42 gm per 100 cc. X-ray examination of the stomach revealed a large, fungating, ulcerated tumor mass, which occupied the greater portion of the stomach, leaving the fundus and immediate prepyloric region free. The tumor was slightly movable and extended high on the posterior wall, where it probably reached slightly above the cardia. The pylorus opened readily.

On the tenth day an operation was performed.

DIFFERENTIAL DIAGNOSIS

DR F DENNETTE AOAMIS. The circumstances of the first admission require little comment. The patient was admitted with a story highly suggestive of some upper gastrointestinal tract disturbance, the roentgenologist demonstrated a gastric lesion, and operation was quite properly performed. We are not told whether the clinicians or the roentgenologist made the preoperative diagnosis. I should not have made it on the basis of the history and physical examination alone, although having been fooled by polyp before, I prob-

ably should have mentioned it in differential diagnosis. I know of no special significance that can be attached to the vomiting immediately after ingestion of cold foods, unless it indicates an unusually irritable stomach. The periodic griping pain, appearing when the stomach was empty and relieved by vomiting or by food, suggests an obstructing ulcer. The night pain also suggests ulcer although characteristically it is described as boring or burning rather than griping. The coffee grounds vomitus and the moderate anemia indicate bleeding, the constipation and loss of weight suggest carcinoma—the latter, however, may have been due to reduction of intake based on fear of eating. The duration of the illness is long for carcinoma. Therefore, without a ray examination to fall back on, my preoperative diagnosis would have been ulcer with obstruction.

The elevation of the nonprotein nitrogen is puzzling, in the absence of any indication of uremia or other sign of kidney impairment, I am inclined to disregard it.

DR TRACY B. MALLORY. All the chemical tests were done postoperatively. The patient developed intestinal obstruction, and that, of course, is what pushed up the nonprotein nitrogen. I shall give you more information about that polyp. The specimen sent to the laboratory showed a freely movable polypoid growth 3 by 4 by 10 cm. That is a large polyp. Microscopic examination showed some degree of atypicity, with papillary growth into the tubules, some hyperchromatic cells, occasional mitotic figures, but no evidence of invasion. The surgical pathologist remarked that the tumor was at the borderline of malignancy, but he was inclined to consider it benign.

A PHYSICIAN. Do polyps cause that much pain?

DR AOAMIS. I suppose one would have to assume that the polyp ever so often worked itself into the pylorus and that the severe griping pain resulted from the effort of the stomach to push it along.

DR MALLORY. Long slender polyps can slip in to the pylorus. This was a broad sessile one, which one would not expect to wander around much.

DR AOAMIS. Then I suppose we must say that polyp per se can cause this kind of pain.

In the second episode, lower abdominal pain again confuses the picture. It might have been due to partial obstruction, caused by adhesions from the previous operations. But since griping did not continue and everything else points to the upper abdomen, we had best look there for the trouble. Events had moved more rapidly this time. Prior to the first admission the patient was sick for five years, on the second entry he had

been sick for only four months. The epigastric pain was constant and not relieved by food; this is not the picture of ulcer. There is nothing to suggest pyloric obstruction. The genitourinary symptoms can be dismissed as incidental; the patient was sixty-three—he had a right to some enlargement of the prostate gland. Physical examination was negative. The blood count and stool examination indicated bleeding. Even without the aid of the roentgenologist, one would be safe in attributing this illness to a gastric lesion. Was it benign or malignant? Did the patient have another benign polyp, an ulcer or a carcinoma? We know that bleeding is common in all three. The character of the pain tends to exclude ulcer. We know that polyps are likely to become malignant. We know that mitotic figures were seen in the tissue removed thirteen years previously, but invasion was not demonstrated. We know that the patient had gone downhill. So that without x-ray I should hazard a diagnosis of carcinoma of the stomach. When we read the report of the roentgenologist, I suppose we must consider the possibility that the ulcerating mass was a polyp. I should still be inclined to make a diagnosis of carcinoma, since ulceration of a benign polyp is not common—that is, ulceration which can be visualized.

A PHYSICIAN: What do you expect from surgery in a case like this?

DR. ADAMS: If the patient had a polyp, it might be removed, or if a carcinoma, a total gastrectomy might prolong life for a while.

DR. MALLORY: A third point always to be considered in such a case is the relief of distressing symptoms for the duration of life. For instance, with carcinoma of the rectum it is often justifiable to resect even in the face of demonstrable metastases in the liver because there may be no other

way of controlling symptoms; one thus gives the patient six months to two and a half years of reasonably comfortable living instead of constant torture. One does not have to feel that a lesion is completely curable to justify operation.

CLINICAL DIAGNOSIS

Carcinoma of the stomach.

DR. ADAMS'S DIAGNOSIS

Carcinoma of the stomach.

ANATOMICAL DIAGNOSIS

Carcinoma of the stomach, with metastases to the regional lymph nodes.

PATHOLOGICAL DISCUSSION

DR. MALLORY: The clinical diagnosis in the wards was carcinoma of the stomach. The patient was explored by Dr. Edward D. Churchill, who found a carcinoma of the mid-portion of the stomach, practically encircling it, with no metastases in the liver but with a few lymph nodes that seemed obviously metastatic along the course of one of the gastric arteries a little farther out than it was possible to carry the resection. On the other hand, the intrinsic stomach tumor was readily resectable, and a subtotal gastrectomy was done. It is presumed that some involved lymph nodes were left behind. The operation was attended with considerable difficulty in its last stages, because the patient had had two previous operations in the upper abdomen and it was very difficult to close the abdominal wound. He left the hospital in about three weeks' time with significant relief from symptoms. He has been in for three follow-up visits and is feeling fine. He is not cured but much more comfortable than he was before operation.

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal
Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of
THE MASSACHUSETTS MEDICAL SOCIETY
and
THE NEW HAMPSHIRE MEDICAL SOCIETY

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SUBSCRIPTION TERMS: \$600 per year in advance postage paid for the
United States Canada \$7.04 per year Boston funds \$8.52 per year for all
foreign countries belonging to the Postal Union

MATERIAL for early publication should be received not later than noon
on Saturday

The Journal does not hold itself responsible for statements made by any
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COMMUNICATIONS should be addressed to the *New England Journal of
Medicine*, 5 Fenway Boston, Massachusetts

Boston hospitals covering anesthesiology, which should be particularly instructive owing to the significant advances that have been made in recent years. No doubt many of the other exhibits will be of as much or more interest, they all deserve particular attention.

The technical exhibits, arranged by medical book publishers, equipment and pharmaceutical houses and other medical service organizations constitute as large a display as has ever been shown at an annual meeting. The physician of today is very dependent on the products or services distributed by all such companies. Books, equipment, drugs and various medical services will be displayed or explained by competent men from the leading firms throughout the country. Members are urged to visit the many booths, both for the information they may acquire, and for the effect it will have on the exhibiting companies. The success of the meeting, from the exhibitor's point of view, is judged on the basis of attendance at his particular space, and a friendly visit to each booth means future assets for the Society.

THE PROBLEM OF ALCOHOLISM

Man has used various drugs throughout the ages to blunt his senses increasing the illusion of pleasure by decreasing the awareness of distress. It seems to me that we are closer to the middle of the road than in most groups one may be abstinent or temperate without being subjected to embarrassing comment. The change in feeling with resulting regulatory laws has been in the main helpful, but it still remains a serious problem. Alcohol is a major cause of insanity, and poisoning from it is the cause of more deaths than many dreaded infectious diseases. Intemperate drinkers may be classed as stable or unstable, and the drinking of the former may be regarded as evidence of disease of the social order, while that of the latter demonstrates disease of the individual. The unstable drinker is particularly susceptible to drinking because he gets so much more pleasure out of alcohol than does the normal individual.

Instability is not the only cause of alcoholic addiction since there are as many unstable men as women in the general population yet there are many more alcoholic men than women. The chronic alcoholic is the result of an unhealthy social custom plus environmental accident plus his instability but a break in any one of these links may save him just as

EXHIBITS AT THE ANNUAL MEETING

The scientific exhibits scheduled for the annual meeting of the Massachusetts Medical Society give promise of the usual high quality and interest. Most of the specialties will be represented, a fact of considerable importance in view of curtailment of the meetings of the various sections. Two exhibits deserve special emphasis. The first is that sponsored by the Regional Committee on Fractures and Trauma of the American College of Surgeons, the Boston Metropolitan Chapter of the American Red Cross and the National Ski Patrol since the first aid treatment of fractures is of timely interest because of the increase in highway and skiing accidents and because of the defense program. The second is an exhibit by sta-

escaping the environmental accident saves many potential victims. . . .

Chronic alcoholics present a greater problem than other drinkers to physicians and health officers, and they are treated by the thousands in public hospitals for acute excesses; they die because of these excesses and from complicating conditions. A large proportion of those who escape premature death go from bad to worse until they become psychotic and find their way into hospitals for mental disease. . . .

The entire problem must be approached without passion or prejudice. We must work with and not against human nature. . . . The harm done by alcohol can be reduced to a minimum by education as to the effects of alcohol, by building up social disapproval of excesses, by making it inconvenient and more expensive to get liquor with a high alcohol content, and by providing more and better hospitalization and less jail treatment for alcoholics. . . . It is not enough to know that some people become drunkards because they are unstable; and that they repeatedly relapse to drink because they are weak. It is necessary to know the nature of their instability and weakness. We should know whether in addition to the predisposing physiologic factor, some people have a special sensitivity to alcohol and if so, what the nature of it is.

The above statements are excerpts from an address by Dr. Thomas Parran, Surgeon-General of the United States Public Health Service, at a symposium of the Research Council on Problems of Alcohol, held in Philadelphia in December, 1940, as a part of the annual meeting of the American Association for the Advancement of Science, and abstracted elsewhere in this issue of the *Journal*. The group, which is engaged in studying the problem of alcoholism in an unbiased scientific manner, could not have made a happier choice of spokesman and keynoter, since Dr. Parran is familiar with the problems, both physical and psychologic, that make the care of the nation's health a matter of greatest importance, along with the care of its finances, its defense and the utilization of its resources. Dr. Parran's attitude betokens a new interest on the part of the federal government, greatly in contrast to the previous concern of federal agencies charged with the enforcement of the Eighteenth Amendment of unhappy memory. The research projects that are now in progress independently and under the sponsorship of the Research Council on Problems of Alcohol lend hope to the possibility that within

the lifetime of even the older readers of the *Journal* alcoholism may take its place along with tuberculosis, syphilis and the various infectious diseases that are now being brought under control. Perhaps this problem, above that of all other diseases, must be attacked by prevention and education rather than by direct treatment. The greatest assistance that every physician can lend is an attitude of open-mindedness and an appreciation of the well-established fact that excessive drinking is a symptom of a basic disorder of personality.

MEDICAL AID TO CHINA

UNITED China Relief, of which the American Bureau for Medical Aid to China is one of the seven participating agencies, has designated May 18 to 25 as China Week. On May 19, Medical Aid-to-China Day, Dr. Robert K. S. Lim, director-general of the Medical Relief Corps of the Chinese Red Cross, will broadcast from China, other broadcasts will be given in cities all over the United States, ambulances in certain key cities will solicit funds, and street drives will be held.

Of the tremendous medical problem the war has created in China and of the gallant efforts of such men as Dr. Lim to meet the problem, probably many physicians are aware, and it is hoped that the medical profession will wholeheartedly support this drive to obtain funds that are so badly needed.

MEDICAL EPONYM

HIRSCHSPRUNG'S DISEASE

Professor Harold Hirschsprung (1830-1916), of Copenhagen, presented to the Gesellschaft für Kinderheilkunde in Berlin, 1886, a report of two cases of "Stuhlträgheit Neugeborener in Folge von Dilatation und Hypertrophie des Colons [Constipation in the Newborn as the Result of Dilatation and Hypertrophy of the Colon]." His paper was printed in the *Jahrbuch für Kinderheilkunde und Physische Erziehung* (27: 1-7, 1888). It was not until November 17, 1889, however, that he specifically described "Die angeborene Erweiterung und Hypertrophie des Dickdarms [Congenital Dilatation and Hypertrophy of the Colon]," in an article contributed to the *Paediatrische Arbeiten*

(78-86, Berlin, 1890), which was published as a *Festschrift* in honor of the seventieth birthday of Edouard Henoch. A portion of the translation follows:

There occasionally occurs in children a congenital marked dilatation of the colon with coincident thickening of its wall—as yet observed only in boys.

The commonest important symptom is difficulty in defecation, beginning immediately after birth and at times associated with enormous distention of the lower abdomen.

It seems that the condition is compatible with continued existence and that occasional cases of habitual stubborn constipation with large abdomen in older children and adults may be due to this congenital affection.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

COMMITTEE OF ARRANGEMENTS

The following physicians have consented to act as aides to the Committee of Arrangements at the annual meeting of the Society on May 21 and 22:

Dr. Robert Barker.
Dr. Richard Dwight.
Dr. Roy J. Heffernan.
Dr. Harrison K. Kennard.
Dr. Stanley Kimball.
Dr. John F. McManus.
Dr. R. Bretney Miller.
Dr. Richard S. Nugent.
Dr. Allen G. Rice.
Dr. Frederick Tudor.
Dr. George C. Tully.

EDWARD J. O'BRIEN, M.D., *Chairman*.

SECTION OF MEDICINE

The Section of Medicine calls attention to the following schedule for the round-table luncheon meeting on Wednesday, May 21, at the University Club:

Subject: The Use and Abuse of Drugs in Heart Disease. Dr. Paul D. White, Boston.

12:00-12:45 Preliminary discussion.

12:45-1:30 Luncheon.

1:30-2:00 Question period.

ALBERT A. HONOR, M.D., *Chairman*.

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

CESAREAN SECTION AND APPENDECTOMY, FOLLOWED BY BRONCHOPNEUMONIA AND DEATH

A thirty-six-year-old para III entered the hospital at term but not in labor, and an elective cesarean section was performed. She had been seen routinely since the fourth month.

The past history showed that the patient had had no serious medical conditions. Her first delivery, twelve years previously, was said to have been moderately difficult, the baby weighing 7 pounds, 2 ounces. The second delivery six and a half years previously was not so difficult as the first, and the baby weighed 8 pounds.

On physical examination, the heart was not enlarged; there were no murmurs. The lungs were clear and resonant; there were no rales. The blood pressure was normal—120 systolic, 60 diastolic. There was no edema. The presentation was normal. Cesarean section was decided on because the patient expressed a desire not to go through labor and because she was "in not too good general health." The anesthetic employed was nitrous oxide, oxygen and ether, which was taken badly. The operation included a low cervical cesarean section, sterilization and appendectomy.

On the second postoperative day, the patient's temperature was 103°F., with a pulse of 104. Bronchial breathing was said to have been heard before death, which occurred on the fourth day after operation, and bronchopneumonia was recorded as the cause of death.

Comment. Cesarean section, even when electively performed, carries with it certain risks; pneumonia is one, sepsis another, and hemorrhage a third. There seems very little medical justification for performing such a hazardous operation on a patient who has had two previous pelvic deliveries. The desire of the patient to be saved the discomfort of labor, in this day of comparative freedom from pain afforded by modern analgesics, should never influence the surgical decision. Furthermore, there is some controversy over the advisability of performing an appendectomy at the same time as a cesarean section. Although a few

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

men consider such an appendectomy a harmless performance, it is not permitted at the majority of obstetric clinics in Boston.

The patient had excellent obstetric care throughout her pregnancy, and there seems to have been no justifiable reason for performing the cesarean section and the appendectomy, which undoubtedly were major factors in the fatal result. Obstetric rules and regulations should follow the routine laid down by the best metropolitan institutions, and the trustees of hospitals should insist that they be followed explicitly.

DEATHS

MURPHY—**FREDERICK P. MURPHY, M.D.**, of Lowell, died April 26. He was in his sixty-second year.

He received his degree from Tufts College Medical School in 1905. Dr. Murphy was a member of the Massachusetts Medical Society, president of the Middlesex North District Medical Society from 1936 to 1937, a member of the American Medical Association and the New England Obstetrical and Gynecological Society.

SWEET—**FREDERICK B. SWEET, M.D.**, of Springfield, died May 10. He was in his seventy-second year.

Dr. Sweet received his degree from Yale University School of Medicine in 1893. He had been a trustee of the Springfield Hospital since 1911, and visiting surgeon since 1904. He was also consulting surgeon at the Mary Lane Hospital in Ware and the Wing Memorial Hospital in Palmer.

Dr. Sweet was a member of the Massachusetts Medical Society, president of the Hampden District Medical Society from 1929 to 1930, a fellow of the American Medical Association, and a member of the American College of Surgeons and the New England Surgical Society, of which he had been a president.

His widow and two daughters survive him.

MISCELLANY

ANNUAL PRIZE SUBSCRIPTION

The annual prize subscription offered by the *New England Journal of Medicine* for the best undergraduate contribution to the *Tufts Medical Journal* has been awarded to Ralph M. Myerson, '42, for his paper "Endometriosis," which appeared in the March, 1941, issue. The paper "Hypoglycemia in the Non-Diabetic" by Henry J. Myers, '41, received honorable mention; it will appear in the May issue of the *Tufts Medical Journal*.

MAINE NEWS

ANNUAL MEETING OF THE MAINE MEDICAL ASSOCIATION

The program for the eighty-ninth annual meeting of the Maine Medical Association, to be held at the Marshall House, York Harbor, on June 22, 23 and 24, is as follows:

SUNDAY, JUNE 22

Golf preliminaries.

4:30 p.m. First meeting of the House of Delegates.

8:30 p.m. Entertainment for the members and their wives.

MONDAY, JUNE 23

9:30 a.m. Group conferences.

12:30 p.m. Luncheon (tables reserved for alumni of various medical schools and members of the Tumor Clinics).

2:00 p.m. Introduction of visiting delegates.

2:00 p.m. Scientific session.

5:00 p.m. Election of president-elect.

5:30 p.m. Second meeting of the House of Delegates.

7:00 p.m. Reception to President and his wife.
Dinner and dancing.
Presentation of fifty-year medals.

TUESDAY, JUNE 24

9:30 a.m. Group conferences.

12:30 p.m. Luncheon (tables reserved for past presidents and county secretaries).

2:00 p.m. Scientific session.

Golf finals.

7:00 p.m. Banquet (dress informal):

Address: Frank H. Lahey, M.D., president,
American Medical Association.

RÉSUMÉ OF COMMUNICABLE DISEASES IN MASSACHUSETTS FOR MARCH, 1941

DISEASES	MARCH 1941	MARCH 1940	FIVE-YEAR AVERAGE*
Anterior poliomyelitis	1	1	0
Chicken pox	1408	1471	1441
Diphtheria	8	7	14
Dog bite	671	727	740
Dysentery, bacillary	3	36	12
German measles	147	56	235
Gonorrhea	324	308	420
Lobar pneumonia	370	609	744
Measles	3127	1486	2957
Meningococcus meningitis	10	3	17
Mumps	1349	866	1326
Paratyphoid B fever.....	3	11	4
Scarlet fever	651	608	1141
Syphilis	462	501	540
Tuberculosis, pulmonary.....	318	218	277
Tuberculosis, other forms.....	33	20	35
Typhoid fever	3	3	5
Undulant fever	6	5	3
Whooping cough	969	644	920

*Based on figures for preceding five years.

RARE DISEASES

Anterior poliomyelitis was reported from: Framingham, 1; total, 1.

Diphtheria was reported from: Auburn, 1; Boston, 3; Fall River, 1; Malden, 1; Newburyport, 2; total, 8.

Dysentery, bacillary, was reported from: Boston, 1; Danvers, 1; Southborough, 1; total, 3.

Infectious encephalitis was reported from: Agawam, 1; Springfield, 1; total, 2.

Malaria (therapeutic) was reported from: Foxboro, 1; total, 1.

Meningococcus meningitis was reported from: Barre, 1; Boston, 2; Brockton, 1; Dartmouth, 1; New Bedford, 3; Ware, 1; Winthrop, 1; total, 10.

Paratyphoid B fever was reported from: Adams, 1; Belmont, 1; Peabody, 1; total, 3.

Pfeiffer bacillus meningitis was reported from: Worcester, 1; total, 1.

Rocky Mountain spotted fever was reported from: Northampton, 1; total, 1.

Septic sore throat was reported from: Amesbury, 3; Ashland, 1; Beverly, 2; Boston, 3; Cambridge, 1; Chicopee, 1; Concord, 2; Fall River, 2; Lynn, 2; Malden, 1;

Medford, 2, Millbury, 1, Monson, 1, Waltham, 1, total, 23
Trahoma was reported from Arlington, 1, Boston, 1,
Peabody, 1, total, 3

Trichinosis was reported from Boston, 1, total, 1
Typhoid fever was reported from Holyoke, 1, Spencer, 1, Winthrop, 1, total, 3
Undulant fever was reported from Boston, 1, Leominster, 2, Somerset, 1, Westford, 2, total, 6

The first case of anterior poliomyelitis for the year was reported in March

Chicken pox, diphtheria, bacillary dysentery, meningococcus meningitis and tuberculosis (other forms) were reported below the five year averages

The number of cases of dog bite increased over the first two months of this year, but it is the lowest reported for the month since 1934

Although German measles was reported below the five year average, more cases were reported than in any corresponding month since 1936

Lobar pneumonia was reported at a record low figure for the month

Scarlet fever increased, although it was reported below the five year average.

Whooping cough was reported above the five-year average.

Typhoid fever and paratyphoid fever showed low incidence.

Measles, which has climbed steadily since October showed a sudden upswing in March

There was a slight upward swing of undulant fever

CORRESPONDENCE

MEDICAL STUDENTS IN RELATION TO THE SELECTIVE SERVICE ACT

To the Editor I believe that in carrying out the provisions of the Selective Service Act we should do well to bear in mind the spirit as well as the letter of the law—at times even shading the latter in favor of the former. Our aim is speed and efficiency in preparedness. When immediate speed may sacrifice ultimate efficiency, we should prefer the latter.

The question of medical school students is one worthy of careful scrutiny. A medical man spending one year to become a soldier would be of no added value to his country since he would never be used in that capacity—hence, a waste of national funds.

If the students now in a Grade A medical school are removed for defense training, the school will be gradually depleted of its best men. It must either admit men of less ability, resulting in a lowered standard of physicians for army and civilian needs, or refuse to replace them and so limit the number available. Both alternatives affect ultimate efficiency and do harm to the nation.

I have said a year spent in military camp by a medical man is wasted to the country because he will not be used as a soldier. A student becomes of less value to the profession and the nation in so far as his training is interrupted. From discussions with others I learn that, if taken for defense training, some students will not return to the medical profession at all first, because of the expense, secondly, because the six or eight years of further training are already long and adding another year makes this long period prohibitive.

Our best medical schools are unsurpassed anywhere. Students are selected on the basis of marked aptitude and about one out of eight or ten applicants is accepted. These men show promise of supplying our future needs in all branches of medicine and surgery.

I am told that the average IQ of the selective service men at one of our largest camps is extremely low. With less than a high school education, it takes one year to make a soldier. It takes ten years for a high school graduate to become a good doctor, and thirteen to become a specialist.

This is the age of scientific warfare. Men in training for specialized work in this and other occupations essential to preparedness should not be hindered, on the contrary, every precaution should be taken to see that their training is completed as soon as possible.

A Memorandum to All State Directors (1-10), dated March 7, 1941, from the National Headquarters of the Selective Service System explains in further detail what discretionary powers the local board may exercise. Deferment in Class II A is permitted where the activity for which the registrant is in training or preparation is one essential to the national health, safety or interest, and the registrant is found to be a necessary man. Group deferments may not be made. 'The period of deferment in Class II A may not exceed six months, but such deferment may be renewed from time to time if the local board finds that such continuance is justified under the regulations.' In other words the local board must consider all the evidence submitted in connection with each individual case and must decide each case on its particular facts.

Since writing the above I have learned something of the English point of view (*Science*, April 4, 1941). "Medical students in England are not subject to draft." Extraordinary precautions are taken to ensure uninterrupted preparation. To this end some of the students are being sent to this country and Canada. I quote, "A break in the chain of medical teaching in any country spells disaster for the coming generation."

Finally from Washington comes the last bit of evidence. The Murray Bill—aimed at exempting medical students from service until they are thoroughly trained—has been defeated. Strangely ironic is the President's appeal for one thousand doctors to go at once to England, so soon on top of the defeat of that bill. Send them by all means since they are so sadly needed but in the face of this conclusive proof of the importance of trained physicians in time of war we are deliberately inviting the same disaster by cutting down our own future supply!

FRANCIS G. BARNUM.

1776 Beacon Street,
Brookline, Mass

REPORTS OF MEETINGS

HARVARD MEDICAL SOCIETY

A regular meeting of the Harvard Medical Society was held at the Peter Bent Brigham Hospital on February 11, with Dr. Soma Weiss presiding.

The first case, presented by the medical service, brought up the differential diagnosis between pneumonia and lung abscess. The patient had been given sulfathiazole treatment. In discussing the case, Dr. Maxwell Finland stated that the signs and symptoms more or less resembled those of a virus pneumonia but that the x-ray appear

ance was solid rather than flaky. The rash across the bridge of the nose closely simulated that of sulfathiazole, which has also caused episcleritis in a few cases and in which the skin lesions are marked on the elbows and knees, as in erythema nodosum. Dr. Merrill C. Sosman described the roentgen findings in virus pneumonia as being more of a diffuse haze similar to that of congestive failure. Dr. Weiss cited two cases of staphylococcal pneumonia treated with sulfathiazole for eight or nine days with persistent fever, which decreased when chemotherapy was stopped. Dr. Finland stated that long-standing fluid is often sterile and that adhesions may simulate empyema by x-ray study.

The second case, presented by the surgical service, was that of a middle-aged woman with a complicated past history whose operation for cholecystitis was delayed five days by an upper respiratory infection. Her post-operative course was uneventful until the fourteenth day, when she had a chill, severe chest pain, a dry painful cough, a fever of 102°F. and some tenderness of the left leg. There were respiratory difficulty and hemoptysis, and the sputum revealed Type 29 pneumococcus. The signs remained unchanged until the third day, when sulfathiazole therapy was instituted and gradual improvement began. Dr. Elliott C. Cutler briefly discussed post-operative pulmonary complications. The most frequent immediate problem is that of atelectasis, whereas, later, embolic phenomena are commoner, as in this case. Dr. Cutler considered it wise to employ the sulfonamides more generally in pulmonary infarction to ward off incipient secondary infection. Dr. Finland stated that the higher types of pneumonia are often from the throat and may not be significant, although secondary infection is very common in such cases as the one described above. It has been found that early postoperative pneumonias have significant pneumonia types and bacteremia about half as often as true lobar pneumonias, so that at least a part of them are true pneumonias that are incidental to the operation.

The speaker of the evening was Dr. Maxwell Finland, of the Boston City Hospital, whose subject was "Treatment of Pneumonia." As an indication of what may be expected among the armed forces during the present war, the speaker cited statistics among the African mine workers, whose condition and environment can certainly be no better than those of our troops. In this group the mortality has dropped from 13 per cent in a period from 1934 to 1937 to 6 per cent in 1938, following the introduction of sulfapyridine, and to slightly over 2 per cent in 1939. Although the results at an institution like the Boston City Hospital cannot be improved so markedly, it is possible by well-controlled observations on a large series of patients to evaluate the relative merits of drugs and to determine the status of specific anti-pneumococcus serum. On the whole, one should use the easiest, safest and cheapest method of treatment, but should be prepared to use auxiliary methods in any case in which it may significantly improve or cure an otherwise lost patient.

It was emphasized that there are always drug failures when enough cases are observed. In the first season of sulfapyridine at the Boston City Hospital the mortality with serum was only 13 per cent, as compared with that of 18 per cent for chemotherapy and 24 per cent for combined treatment. Most statistics failed to show this favorable result with serum because it is used either not enough or not well enough. More of the sick patients receive the combination treatment because of drug failures,

which would increase the mortality of the drug-treated patients if properly interpreted. The statistics at the Boston City Hospital for the last three years were essentially the same except in the increase in the number of patients treated and the significant lowering of the mortality with sulfathiazole treatment. However, when the statistics were broken down in regard to bacteremia, age, number of lobes involved and so forth, it was found that the results in each group were identical, regardless of the drug used. Since all data now indicate that the drugs are equally effective in comparable cases, the ease and safety of administration become important. In this regard sulfathiazole results not only in less nausea and vomiting than sulfapyridine, but what is more important, the severity is far less. Relapse is also much less frequent, and this may be attributable to the early discontinuance that is so often necessary with sulfapyridine. Urinary complications are about the same but may be decreased when it is learned that the circulating blood levels do not need to be so high. Anemia and leukopenia occur slightly less often with sulfathiazole, whereas drug fever and rash occur three times as often with this drug, sometimes even after it has been omitted. The distinctive rash of sulfathiazole has been described above. It was concluded, therefore, that although sulfathiazole is not definitely less toxic, it is much easier to administer and therefore becomes a choice when pleasing the patient is so important.

The drug level is usually considered best at 4 or 5 mg. per 100 cc., but many good results have been obtained with lower levels. The favorable response with these variable and low levels may be explained by the fact that the bacteria are often either of low virulence or in small numbers so that even less than 1 mg. per 100 cc. is effective, especially if a medium is free of inhibiting substance. The newest sulfonamide, a guanidine compound, has a more sustained and higher level in the blood, owing to a lesser degree of acetylation, and all toxic symptoms seem less severe. Preliminary results seem to indicate that it is at least as effective as the other drugs.

The status of specific serum therapy has now become difficult to evaluate because of the availability of the comparatively easily administered drugs. Combination therapy apparently offers the best results both experimentally and from what few clinical data are at hand. Owing to its earlier action, serum may be advantageous in the more serious cases, such as those in the aged, those with bacteremia and those in which several lobes are involved. Serum may decrease the numbers of bacteria to a level where the drug may be effective. It is probably also beneficial in cases that fail to respond to chemotherapy within forty-eight hours, for the bacteria not killed at that period have become acclimated to the drug and are no longer amenable to such treatment. It is important to realize that in some cases serum is ineffective when used late, and that one should probably attempt to evaluate the cases early, so that serum may be given then if it is necessary.

In conclusion, Dr. Finland briefly discussed the recent respiratory epidemic, in which many cases of pneumonia arose as a complication. The initial attack seemed to be characteristic influenza often with a negative chest examination. There was a high incidence of staphylococcal pneumonia with bacteremia in some and empyema in others, with a definite tendency toward spontaneous cure. There were many cases of persistent sterile effusions; others went on to abscess formation. Roentgenograms were variable, revealing consolidation or rarefaction, or

similar to the lesions of virus or staphylococcal pneumonia. The discussion was opened by Dr John Enders, who described the isolation of a virus from uncomplicated cases of influenza that had a typical response in ferrets similar to that of Type A. Dr Joseph H Pratt stated that there had been only three deaths in 89 patients at his clinic, two of these being patients with chronic alcoholism and the other an eighty-year-old cardiac patient. Dr Wald S King presented statistics from the Massachusetts General Hospital revealing that the mortality for the preceding introduction of chemotherapy was less than that of the past year. Results from the Montreal General Hospital in 100 cases treated with sulfapyridine showed a 7 per cent mortality. They have also experienced the same staphylococcal pneumonias following the 1918 influenza epidemic.

BOSTON ORTHOPEDIC CLUB

At the regular meeting of the Boston Orthopedic Club was held on February 17, with Dr Robert J Joplin presiding. W L Aycock spoke on "The Epidemiology of Polio Myelitis." In introduction, he remarked that many theories have been advanced because of the lack of an adequate single explanation, and that the tendency is to offer the most bizarre ones. Since observations on his disease are limited by Nature and most series are small, generalizations are apt to be drawn from limited variations and contradictory facts appear.

It was emphasized that the distribution patterns of the virus and the paralytic form of the disease are not necessarily the same. The virus is widespread, as in all contagious diseases. Dr Aycock deprecated the tendency toward emphasizing the method of spread and implicating the gastrointestinal tract. The mere presence of an organism does not necessarily indicate its importance, and finding of the tubercle bacillus or the measles virus in the feces does not mean that this is their mode of transmission.

Paralysis is limited, irregular and selective, despite the widespread occurrence of the virus of poliomyelitis. Therefore, something in the person exposed probably determines in large measure who shall be paralyzed. Dr Aycock discussed various selectivities. Warm climates and seasons apparently decrease the incidence of paralysis despite the same prevalence of the virus as shown by immunity studies. This is a physiologic rather than an anatomic selectivity. That there is some inherent familial deficiency seems to be borne out by the higher incidence of affected families than in the general population and the frequent recurrences. This is in marked contrast, for example, to measles. The possibility of an endocrine factor is suggested by the higher incidence of paralysis in the Frohlich type of person. Such patients, although of that habit at the time of the attack, may develop immunity of that distribution at puberty. Many observers do not agree with this observation, which is a clinical one.

Another argument in favor of an endocrine factor is the high incidence of paralysis during pregnancy. This is also indicated by a mucous-membrane susceptibility, which is supported by other observations, for the endonervous system involved in pregnancy are known to affect the mucification of mucous membrane. Long in Detroit indicated that there were more than four times as many cases of paralysis during pregnancy as would be expected from statistics. Another observation in favor of a susceptible mucous membrane is the relation of bulbar paralysis to operative tonsillectomy and adenoidectomy. The oc-

currence on the seventh to the fourteenth day postoperatively fits well with the supposed incubation period of poliomyelitis. At the Children's Hospital, of 400 cases of spinal paralysis only 2 occurred following adenoidectomy, whereas 17 of 132 cases of bulbar paralysis occurred following tonsillectomy.

In experimental primates it has been found that castrates treated with estrin become paralyzed early, if at all, and that the incidence in this group is definitely lower than in the nontreated group, who all develop paralysis. In human beings there is an elevated urinary estrogen in pregnancy, but an increased excretion does not indicate an increased utilization of hormone. Furthermore, the urinary estrogen levels are higher, no matter how separated, in all cases of poliomyelitis.

Dr Aycock stated that none of the three usual methods of control are feasible. The disease cannot be checked at its source when the reservoir is the entire population. Spread can hardly be prevented when human intercourse is the only known method of spread. Vaccination was held nonfeasible when an entire population must be vaccinated and the incidence of paralysis at most is only one in a million. Furthermore there will probably never be a safe vaccine. Exposures cannot be limited or accurately judged in comparison with other dangerous diseases such as rabies.

The discussion was inaugurated by Dr Frank Ober, who emphasized the occurrence of multiple cases in families, particularly the less severe, abortive cases. Thirty per cent of so-called abortive cases in Vermont were subsequently found to have a facial paralysis—evidence that more than the limbs should be examined. In regard to climate, Dr Ober is not so sure it is not dietary habits that play a role—possibly vitamin B. For there has been an inadequate diet in Vermont and the South. It is interesting that in a southern town of 60,000 population where there was said to be no poliomyelitic paralysis, Dr Ober was able without advance notice to round up 11 cases. The finding of so many endocrine types at the Children's Hospital had led him to believe that a certain physiologic pattern may develop paralysis.

Dr Moses H Lurie discussed the susceptibility of the nasopharyngeal mucous membrane to the poliomyelitic virus. He did not consider estrogens beneficial in the treatment of atrophic rhinitis. He has observed that 60 per cent of the patients who develop post-tonsillectomy paralysis have the bulbar type. It is well known that the mucous membranes are not intact for thirty days post-operatively. In cases of paralysis following vaccination, the region of the cord affected was that supplied by the nerve at the injection site. Since the glossopharyngeal, vagus and spinal accessory nerves are essentially one system—the nucleus ambiguus—it is conceivable that the virus travels along the first of these and affects the whole system. Therefore, tonsillectomy is not advocated during an epidemic because of the danger of bulbar rather than spinal paralysis. It was stated that the incidence of paralysis is probably no greater than that of other infectious diseases.

Dr Aycock concluded the meeting by emphasizing that vaccination is not feasible in such a usually innocuous disease. In fact the disease itself is really a successful vaccination since only an occasional person develops paralysis of the many who are exposed. In contradiction to the diet theory he pointed out that only certain Vermont families develop paralysis where all eat the same food, whereas members of a family develop the condition despite diet living conditions and geographic differences.

NOTICES

BOSTON CITY HOSPITAL

There will be a staff clinical meeting of the Boston City Hospital on Friday, May 23, at 12 m. in the Cheever Amphitheater, Dowling Building.

PROGRAM

- The Peculiarities of Disease in Children. Dr. James W. Redmond.
 The Neurological Aspects of Pediatrics. Dr. Eli Friedman.
 Dermatological Conditions in Pediatrics. Dr. Francis J. Wenzler.
 Borderline Conditions, Medical and Surgical, in Pediatrics. Dr. John C. Faherty.
 The Anemias in Children. Dr. Eugene F. Callanan.
 Allergy in Children. Dr. Abraham N. Caplan.

SOUTH BOSTON MEDICAL SOCIETY

The thirty-sixth annual meeting of the South Boston Medical Society will take place on Monday, May 19, at the Harvard Club, Boston.

PROGRAM

- 6 p.m. Business meeting.
 7 p.m. Dinner.
 Dr. Chester S. Keefer will speak on "The Modern Treatment of Meningitis."

Reservations for the dinner should be made by Saturday, May 17, and should be sent to Dr. J. Charles Seymour, secretary, 534 Broadway, South Boston.

NEW ENGLAND SOCIETY
OF PHYSICAL MEDICINE

The annual business meeting of the New England Society of Physical Medicine will be held at The Copley-Plaza on Wednesday, May 21, at 5 p.m. Reports of officers and committees will be presented, and officers for the ensuing year will be elected.

UNITED STATES CIVIL
SERVICE EXAMINATIONS

- Senior Medical Officer, \$4600 a Year
 Medical Officer, \$3800 a Year
 Associate Medical Officer, \$3200 a Year

The United States Civil Service Commission has announced open competitive examinations to fill medical-officer positions in the United States Public Health Service and Food and Drug Administration, Federal Security Agency; Veterans Administration; Civil Aeronautics Authority, Department of Commerce; and Indian Service, Department of the Interior. Applications must be filed with the United States Civil Service Commission, Washington, D. C., and will be rated as received until further notice.

Applicants must have graduated with an M.D. degree from a recognized medical school, and must have had professional experience in one of the following optional branches: aviation medicine; cancer research; cardiology; dermatology; eye, ear, nose and throat (singly or combined); general practice; industrial medicine; internal medicine and diagnosis; medical pharmacology; neuro-

psychiatry; pathology; bacteriology and roentgenology (singly or combined); public health; surgery; tuberculosis; and urology. For some positions in the Veterans Administration applicants for associate medical officer, paying \$3200 a year, need not have had experience other than one year of internship. Applicants for the associate grade must not have passed their fortieth birthday, and for the other two grades must not have passed their fifty-third birthday.

Full information regarding the examinations and the application forms may be obtained from the Secretary, Board of United States Civil Service Examiners, at any first-class or second-class post office, or from the United States Civil Service Commission, Washington, D. C.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING
SUNDAY, MAY 18

MONDAY, MAY 19

- 12:15-1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.
 6 p.m. South Boston Medical Society. Harvard Club, Boston.

TUESDAY, MAY 20

- *9-10 a.m. Clinicopathological conference. Drs. C. S. Keefer and H. E. MacMahon. Joseph H. Pratt Diagnostic Hospital.
 *12 m. Certain Practical Aspects of Blood Disorders as Seen by the General Practitioner. Dr. Henry Jackson, Jr. South End Medical Club, Headquarters of the Boston Tuberculosis Association, 534 Columbus Avenue, Boston.
 12:15-1:15 p.m. Clinicorontgenologic conference. Peter Bent Brigham Hospital amphitheater.

WEDNESDAY, MAY 21

- Annual meeting, Massachusetts Medical Society. The Copley-Plaza, Boston.
 *9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.
 *12 m. Clinicopathological conference. Children's Hospital.
 3 p.m. Massachusetts Medico-Legal Society. The Copley-Plaza. State salon.
 5 p.m. New England Society of Physical Medicine. The Copley-Plaza, Boston.

THURSDAY, MAY 22

- Annual meeting, Massachusetts Medical Society. The Copley-Plaza, Boston.
 *9-10 a.m. Extrarenal Azotemia. Dr. Emanuel Ginsburg. Joseph H. Pratt Diagnostic Hospital.

FRIDAY, MAY 23

- *9-10 a.m. Some Current Problems in Gastrointestinal Surgery. Dr. Richard Warren. Joseph H. Pratt Diagnostic Hospital.
 12 m. Boston City Hospital, staff clinical meeting. Cheever Amphitheater, Dowling Building.

SATURDAY, MAY 24

- *9-10 a.m. Hospital case presentation. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

*Open to the medical profession.

- MAY 28-JUNE 2—American Board of Obstetrics and Gynecology. Page 262, issue of February 6.
 MAY 29-31—Medical Library Association. Page 671, issue of April 10.
 MAY 30, 31—American Heart Association. Hotel Statler, Cleveland.
 MAY 30-JUNE 2—American College of Chest Physicians. Hotel Statler, Cleveland.
 JUNE 2—American Medical Golfing Association. Page 785, issue of May 1.
 JUNE 2-6—American Medical Association. Cleveland.
 JUNE 2-6—Woman's Auxiliary, American Medical Association. Hotel Carter, Cleveland.
 JUNE 4—Harvard Medical Alumni Association. Page 790, issue of May 1.
 JUNE 22-24—Maine Medical Association. Marshall House, York Harbor, Maine.
 OCTOBER 13-24—1941 Graduate Fortnight of the New York Academy of Medicine. Page 834, issue of May 8.
 OCTOBER 14-17—American Public Health Association. Page 579, issue of March 27.

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

The Pharmacology of Anesthetic Drugs A syllabus for students and clinicians By John Adriani, M.D., instructor in anesthesia, New York University College of Medicine, and assistant visiting anesthetist, Bellevue Hospital 4th, cloth, 86 pp., with 102 illustrations Springfield, Illinois Charles C Thomas, 1941 \$3.50

Help Your Doctor to Help You A series of five medical books *Gastric or Duodenal Ulcer*, 53 pp., *Gallstone and Disease of the Gallbladder*, 41 pp., *Colitis*, 30 pp., *Food Allergy*, 50 pp., *Sick Headache or Migraine*, 37 pp. Ed. statistical Board Dr Walter C Alvarez, editor in-chief, Dr George Blumer, Dr Logan Glendening, Dr Irving Cutler, Dr Howard W Haggard, Dr Rudolph Matas, Dr Charles W Mayo, Dr George R Minot, Dr John H Stokes and Dr George H Whipple 12th, cloth New York Harper and Brothers, 1941 95c each

How to Prevent Gout By Israel Bram, M.D., medical director, Bram Institute for Gout and Other Glandular Disease 8th, cloth, 182 pp., with 21 illustrations New York E P Dutton and Company, Incorporated 1941 \$2.00

Textbook of Pediatrics By J P Crozer Griffith, M.D. Ph.D. emeritus professor of pediatrics, University of Pennsylvania, consulting physician to the Children's Hospital Philadelphia, and consulting physician to St Christopher's Hospital for Children, consulting pediatricist to the Woman's, the Jewish, and the Misericordia hospitals, and A Graeme Mitchell, M.D., B.K. Rachford Professor of Pediatrics, College of Medicine, University of Cincinnati medical director and chief of staff, Children's Hospital of Cincinnati, director, Children's Hospital Research Foundation, and director, Pediatric and Contagious Services Cincinnati General Hospital Third edition, revised and reset. 8th, cloth 991 pp., with 220 illustrations and 66 tables Philadelphia W B Saunders Company, 1941 \$10.00

Endocrinology The glands and their functions By R G Hoskins, Ph.D., M.D., director of research, The Memorial Foundation for Neuro-Endocrine Research, and research associate in physiology, Harvard Medical School 8th, cloth, 388 pp., with 14 illustrations New York W W Norton and Company, Incorporated, 1941 \$4.00

Neurology Lectures for medical students and general practitioners By Knud H Krabbe, M.D., chief physician Department of Neurology, Kommunehospitalet, Copenhagen 8th, paper, 387 pp., with 4 illustrations Copenhagen Denmark Einar Munksgaard, 1941 \$12.00

Fundamentals of Dermatology By Norman Tobias, M.D. senior instructor in dermatology, St Louis University, assistant dermatologist, Firmen Desloge and St. Mary's hospitals, and visiting dermatologist, St Louis City Sanatorium and Isolation Hospital 12th, cloth, 497 pp., with 143 illustrations Philadelphia J B Lippincott Company, 1941 \$4.75

Cardiac Classics A collection of classic works on the heart and circulation with comprehensive biographic accounts of the authors Fifty-two contributions by fifty-one authors By Frederick A Willius, M.D., M.S. (med.), chief, Section of Cardiology, The Mayo Clinic, and professor of medicine, The Mayo Foundation for Medical Education and Research, Graduate School, University of Minnesota, and Thomas E Keys, A.B. M.A., reference librarian, The Mayo Clinic 4th, cloth, 858 pp., with 102 illustrations St Louis The C V Mosby Company, 1941 \$10.00

Transactions of the American Association of Genito-Urinary Surgeons Fifty-second annual meeting held at Williamsburg Virginia June 20 21 and 22 1940 Volume XXXIII 8th paper, 314 pp., with 123 illustrations and 18 tables St Paul Minnesota The Bruce Publishing Company, 1941

BOOK REVIEWS

Atlas of Electroencephalography By Frederic A Gibbs, M.D. and Erna L Gibbs Fth, cloth, 221 pp., with 18 figures and 102 plates Cambridge, Massachusetts Lew A Cummings, 1941 \$7.00

If there were a hit parade of medical publications, this volume would soon warrant a place high on the list. There are few, if any, authors who can write more authoritatively on electroencephalography, for the labors of Dr and Mrs Gibbs have been foremost in raising the technique and application of the field from obscurity to a place where it is one of the most valuable diagnostic techniques available to the neurologist and neurosurgeon. The physical make-up of the book is impressive at first glance, and as one goes between the covers, its importance becomes increasingly evident.

An interesting format has been employed. Sample electroencephalographic tracings occupy the right page, with their interpretation and comment opposite them on the left in one column, another column on the left page carries the text. The work is dedicated to Dr Hans Berger, father of electroencephalography, and acknowledgment is made in the preface to other workers in the field, to the technical and engineering staff who developed the equipment and to the co-operating institutions from which the material for the tracings was obtained. Enough tracings are reproduced so that the cortical activity for ten seconds or longer can be followed. The records from three or more leads are included, usually the frontal, the parietal and the occipital, unless some particular feature makes a deviation from this practice preferable.

A great many normal records are included for various ages, during sleep and under other more or less standardized conditions. There are, of course, a large number of tracings from patients with various types of epilepsy and in various stages of seizures. The 'interseizure' records are especially interesting, since it is relatively seldom that a diagnostic tracing can be obtained during a convulsion unless the patient is hospitalized. The characteristic changes during hyperventilation and under the effects of low oxygen tensions are well demonstrated. Typical records from patients with birth injuries, meningitis and encephalomalacia multiple sclerosis, cerebral arterio-sclerosis, migraine and chorea are included, and in each case the characteristic features are described. Perhaps the tracings from brain tumor and cerebral hemorrhage localization studies are most interesting aside from those of convulsive type.

The history of electroencephalography, the activity of the cortex and its similarity to that of other tissues are carefully discussed in the text. The technic is described sufficiently, so that a reader who is unfamiliar with the procedure can become oriented. The authors state that the purpose is not to present a textbook but to furnish eye-training, so that a person may be able to recognize the range of the normal activity and recognize obvious mass abnormalities, as well as to present enough information to make the figures understandable. It appears that they have succeeded in these aims and have done a great deal more than that. The bibliography is complete and comprehensive. The book will be especially useful for teaching and reference purposes, since no other work of its type is available.

A Manual of Embryology: The development of the human body. By J. Ernest Frazer, D.Sc. (Lond.), F.R.C.S. (Eng.). Second edition. 8°, cloth, 523 pp., with 282 illustrations. Baltimore: Williams and Wilkins Company, 1940. \$9.00.

The author retains, in this new edition, the plan originally adopted: to give the student some sort of connected mental picture of the developing embryo, rather than a patchy series of discrete descriptions of the formation of organs. There are few changes in the text, a few new drawings have been introduced, and the discussion of the fetal circulation has been recast. Teachers would do well to draw attention to this book.

Bailey's Text-Book of Histology. By Philip E. Smith, Ph.D., Russell L. Carpenter, Ph.D., Wilfred M. Copenhagen, Ph.D., Charles M. Goss, M.D., and Aura E. Severinghaus, Ph.D. Tenth edition. 8°, cloth, 764 pp., with 448 illustrations. Baltimore: Williams and Wilkins Company, 1940. \$6.00.

Here is an excellent textbook of histology. As in previous editions, the five authors have succeeded well in correlating structure with function and in discussing the physiologic significance of the structures described. The book is enriched with many fine illustrations, and the references at the end of each chapter should adequately meet the needs of students who desire to carry out collateral reading on any topic. In this edition, two new chapters have been added—one on morphogenesis, and the other on the organization of nervous tissues. The chapter on nervous tissues has been entirely rewritten, and all the other chapters have been revised.

Bone Graft Surgery in Disease, Injury and Deformity. By Fred H. Albee, M.D., LL.D., Sc.D. Assisted by Alexander Kushner, M.D. 4°, cloth, 403 pp., with 297 illustrations. New York: D. Appleton-Century Company, Incorporated, 1940. \$7.50.

A work sponsored by a pioneer in bone-graft surgery demands attention. The field has been thoroughly covered, and the presentation of the material with the excellent illustrations leaves little to be desired. The introductory discussion of the fundamental principles underlying the grafting of bone is clearly stated. Then follows a chapter setting forth the armamentarium essential to the attainment of the best results in the practice of the art. Anyone who has had any experience with the various technics knows that success depends on the possession of proper tools and long practice in their use. It is beyond question that many failures are to be traced to the lack of necessary equipment and of adequate technical skill.

Minute directions are given for the application of grafting technics to the many conditions for which its aid has been invoked—from spinal fusion for many pathologic and traumatic conditions and lesions at and about the hip joint; to ununited fractures, repair of skeletal defects, plastic bone surgery, arthrodesis and bone block. One can subscribe to all that has been said about the perfection of the technics described without agreeing with the author's enthusiasm in advocating these methods in all the conditions in which he champions their employment.

The Clinical and Experimental Use of Sulfanilamide, Sulfapyridine and Allied Compounds. By Perrin H. Long, M.D., and Eleanor A. Bliss, Sc.D. 8°, cloth, 319 pp. New York: The MacMillan Company, 1939. \$3.50.

This is a complete treatise on the clinical and experimental use of sulfanilamide and allied compounds at the Johns Hopkins Hospital. No one in this country has had a wider experience or done more in the experimental field to develop the use of these drugs. The book is a fundamental text. It is a thorough survey in every detail. It has already become a classic contribution to the subject.

Practical Handbook of the Pathology of the Skin: An introduction to the histology, pathology, bacteriology and mycology of the skin with special reference to technique. By J. M. H. Macleod, M.D., F.R.C.P. (Lond.); and I. Muende, M.B., B.Sc. (Lond.) Second edition. 8°, cloth, 415 pp., with 27 colored and 125 black-and-white illustrations. New York: Paul B. Hoeber, Incorporated, 1940. \$9.00.

The first edition of this handbook, published in 1903, became so popular that it was soon out of print. Since then dermatologists have repeatedly requested a second edition, and this present volume of Macleod's, assisted by Muende, should have the same popularity. It presents the subject of pathologic changes in the skin very clearly and briefly. Practically all recent advances are incorporated in this small volume, containing only a little over four hundred pages. The arrangement is of particular value to the students of dermatology.

There is a discussion of the histology and pathology of the various layers of the skin, beginning with the epidermis as a whole and taking up the individual elements that make up these layers. The corium as a whole is then described, before considering its individual components. The skin appendages are then discussed. The various technical methods are briefly outlined, describing the origin and use of special stains.

There are excellent color and black-and-white photographs to illustrate the text. The experience of long years of teaching is demonstrated by the excellent brief reviews outlined at the end of various sections of the book. The chapter on hair and its pathology is well worth reading.

The authors have failed to mention a few advances, such as the method of studying heavy-metal pigmentation of the skin by the darkfield method, the picture of hematochromatosis and the causative factors of Pinta. The chapter on fungous infections of the skin, although brief, contains sufficient information for the average dermatologist who is not doing special work in mycology.

The authors should be congratulated on their excellent text, which should be in the libraries of all students and practitioners of dermatology.

The New England Journal of Medicine

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VOLUME 224

MAY 22, 1941

NUMBER 21

MASSACHUSETTS MEDICAL SOCIETY

THE ROLE OF THE PHYSICIAN IN A COMPETITIVE SOCIETY*

A WARREN STEARNS, M.D.

BOSTON

Know then thyself, presume not God to scan
The proper study of mankind is man
Pope *Essay on Man* (Epistle II)

THE place of the physician in the community has been fixed by long years of tradition. In primitive society, and in remote history, he was a sort of conjurer or magician called upon in times of great calamity or dire distress as an intermediary between the supernatural and the natural. He has developed throughout history, oftentimes some what ahead of contemporary civilization, and has emerged from the realms of magic, superstition, conjecture and belief, largely through the channels of biology, until today he stands as the exponent of the scientific method as related to human welfare. For many years, through the ever unfolding knowledge of anatomy, physiology and pharmacology, he sought to alleviate suffering by treating the ills with which he found his patients afflicted. His task had largely to do with the treatment of individuals. As medicine took on more and more of a scientific aspect, it is only natural that there should have developed special interests, and thus we find certain physicians whose propensities led them to devote their lives more and more to research and scholarship, they have tended to associate themselves with medical schools. Others very early saw a gain to human welfare in preventive medicine, they therefore occupied themselves in developing the field of sanitation and have tended to occupy posts in the public service. Still the great mass of physicians plied their trade by ministering to the suffering of afflicted individuals.

Latterly, throughout the field of science there has

been a great interest in chemistry. The clearer understanding of certain physiologic and pathologic processes through chemical research, together with the remarkable advance in chemotherapy, has tended to put chemistry very much in the foreground, to the great good of individual sick persons, as well as to society at large. Likewise, through the development of anesthesia and asepsis the field of surgery has grown to a degree of perfection and usefulness beyond the dreams of the most enthusiastic but a few years ago. Let us hope, indeed we may expect, that medical scholarship, as exemplified in the schools, will continue to develop. Certainly the greater and greater participation by governmental departments in sanitary science and preventive medicine carries great promise, while specific therapy and surgery show no evidence of a slackening pace.

Yet man does not live in a vacuum. He has, as Cannon¹ has so ably pointed out, an internal and an external environment. He is a reacting organism continually played upon by environmental stimuli, and his social status has many important medical implications.

Slightly less than two hundred years ago, a wave of humanitarianism came upon Western civilization. Ruthless, predatory man paused for a moment in his egotistic career and cast a pitying glance at his less fortunate brother. He found a substantial component of human society utterly degraded, the depths of degradation being expressed by the jail, the poorhouse and the asylum. Strong hearts and courageous souls sought to alleviate the condition of these persons, and substantial progress was made through the improvement of public institutions. Very early there appeared an important medical component in this undertaking, and doctors were frequently found in positions

*The Annual Discourse delivered at the annual meeting of the Massachusetts Medical Society, Boston, May 22, 1941.
†Dean Tufts College Medical School, Chief, Nervous and Mental Clinic on the Peninsula.

of leadership in this field of human endeavor. At first expressed through better sanitation, more humane treatment and better care of the sick, this medical interest gradually became focused on

complete without a knowledge of the situation in which it was placed. Psychiatry has accordingly tended to some extent to be a bridge over which medicine has passed into the social sciences. Many

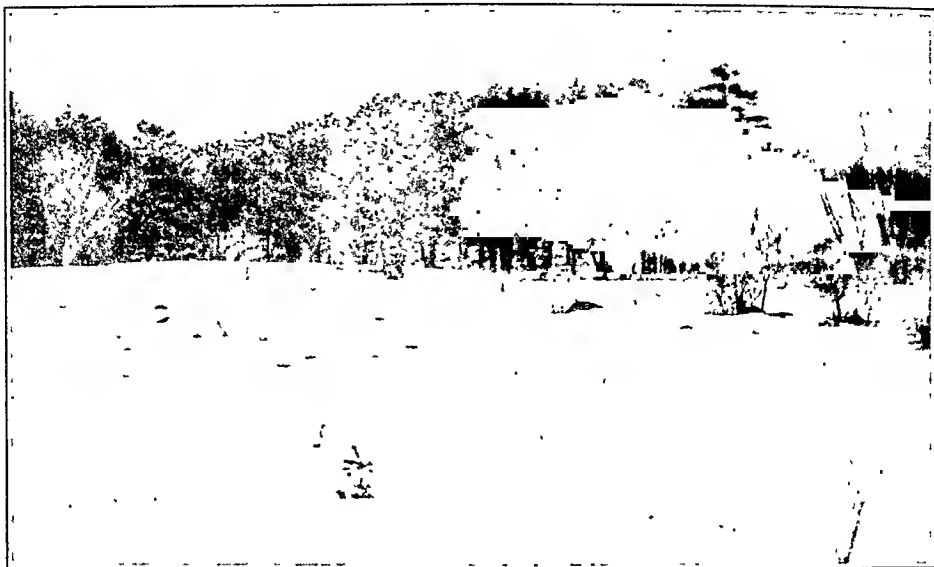


FIGURE 1.

A community of pines, showing a homogeneous appearance.

the personalities of the individuals and their behavior in society. From this lowly origin has developed the specialty of psychiatry, and we now think of many of these submerged persons in terms of mental disease, defect or peculiarity.

of the data of the social sciences were found to be quite sterile so far as their biologic content was concerned, but gradually there has developed in the fields of sociology, psychology and psychiatry a meeting point in the behavior of the individual,



FIGURE 2.

A closer view of the pine community, showing an inequality of growth.

The study of these patients by modern technics of physical examination reveals very little. Nor were the majority of their ills capable of attack by either specific therapy or surgery. It was soon found that a study of the organism was quite in-

and a concern over the situation in which he is placed.

If the problems of medicine are fundamentally biologic, it is important as a means of gaining perspective that the elementary principles of liv-

ing matter be known, and that natural law be kept continually in mind. It is perhaps well to begin our study with some simpler form of life. The pine tree may be taken as an example. If we view a community of pines from a distance, the whole group appears to be a homogeneous mass of verdure, but if we examine it more closely we find it to be made up of individual trees. The most superficial scrutiny shows a gross disproportion in the growth of these trees. Some appear to be sturdier and healthier than their comrades. Their growth has been greater, and they obviously get more sunlight from the air and water

or to Sorokin's¹ concept of a cycle of cultures is not important. Throughout Nature there is a tendency on the part of organisms to develop and grow. I take it that no one will dispute the contention that this principle applies to man as well as to pine trees. Yet, when we study the pine tree our attitude is relatively dispassionate and correspondingly less biased, whereas the study of man immediately involves the operation of factors not present when judging the rest of Nature. Among these factors are the ethical, humanitarian and moral. Nevertheless, this does not invalidate the principle of Darwin's law of the survival of

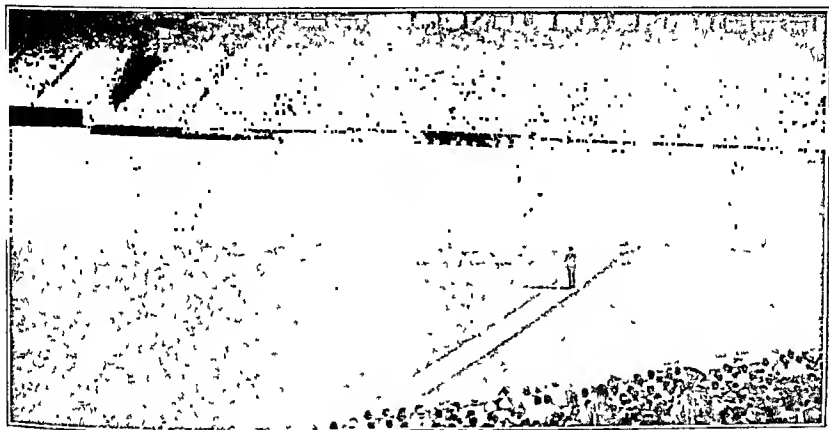


FIGURE 3.

A crowd of people, showing homogeneity.

from the ground than their less fortunate fellows. The stronger ones grow to the hurt and even to the death of surrounding trees. Yet we do not express this greater growth in teleological terminology, or impute hostile motives to the more successful tree. We speak of the survival of the fittest, but do not imply a conscious attempt to destroy one another. This condition can better be expressed in functional terms, as follows: There is a propensity on the part of all trees to grow, and it is a function of certain elements in the trees to get all the sun and water that they can. As a result of the carrying out of this function, growth takes place. The better endowed trees prosper disproportionately. The effect on the other trees is secondary and incidental. Whether we subscribe to Darwin's² evolutionary theory of a constant betterment in nature, to Spengler's³ theory of a rhythmic rise and fall for better or worse

the fittest. It is natural for man to grow. There are elements in his make-up that function to get the wherewithal by which growth takes place. The hurt, if any, to other elements in society is secondary and incidental. The growth of certain persons is bound to be greater than that of others. However this may be, it is a fact that the operation of natural law is as if the conduct of the individual in relation to others were purposeful. The selfish and predatory man operates in society as if he were determined to dominate his fellows, and, in certain cases, to destroy them. For this reason, social engineers must take cognizance of the hurt, if any, done to society by the unrestrained operation of natural propensities in superior individuals. Likewise, it must take cognizance of the frailty, folly and incapacity of others who, though not purposely trying to destroy themselves, act as if such were their purpose.

One fundamental difference between the pine tree and the human being is the effect of growth by the individual on its fellows. With the pine tree, although the community may offer more or less mutual aid through soil conditioning, protection from hurricanes and otherwise, this is not so pronounced as in the human being. Ordinarily, where the human being grows to great stature he provides opportunities for similar, even though less extensive, growth on the part of many asso-

referee our mutual relations, the latter is the field in which it should operate, always being careful not to apply the police technics used to curb exploit for the purpose of interfering with real service. Whether or not the employment of one person by another is service or exploit is a delicate question. Attempts have been made to define it on the basis of wages and hours of work. In actual practice this may have very little to do with determining the distinction. Employment of a handi-



FIGURE 4.

A closer view, showing individual differences.

ciates. In fact, the less capable people are often quite dependent for their status on the initiative, energy and creative genius of those who are superior. When this is done with candor, good faith and fairness, the superior persons may be said to be performing a service to their less well-endowed associates. On the other hand, there is a line beyond which this becomes a disservice and is called exploit. Veblen⁵ designates the means of exploit as force and fraud. If we accept this definition, any use of another's talents that embodies force or fraud is exploit and may be considered a disservice. Obviously, if the government essays to

capped person at a low wage may be a great service to both the individual and the community.

If this same type of scrutiny is applied to society, in the mass, human beings appear to be very much the same. Their basic physiologic striving is identical, and we often speak of society as if it were a homogeneous mass of identical individuals. Here again closer scrutiny shows a stratification. By whatever standard we measure individuals, whether political, economic or social, each falls in a rather definite place in a great social hierarchy. According to Sorokin⁶ this is true of every society that has been the object of scrutiny.

Leveling processes have been tried from time to time, but have always ended in disaster. Sorokin speaks of the social structure as a cone, the profile of which, although it fluctuates somewhat from time to time, tends to be the same. During good times, the rich grow richer, but every element of the cone shows a similar benefit. The general character of the cone remains about the same.

Again, if we scrutinize this social mass we note a constant mobility. That is, we find a tendency on the part of certain organisms to grow out of proportion to certain other elements and to rise to a higher and higher level. Certain other elements either remain stationary or tend to settle out, forming a vast sediment of relative immobility

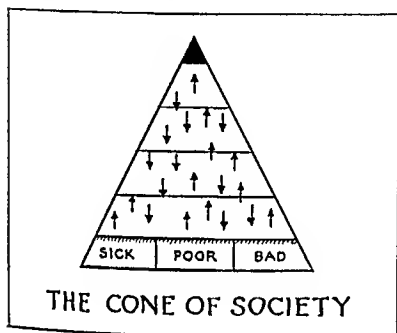


FIGURE 5.

This Cone of Life shows the relatively greater numbers in the lower registers, and the general mobility of the mass of the cone, with a settling out of the more seriously handicapped into the lower strata.

at the lower levels. To be sure, certain persons, through the wisdom of trustees, are able to remain more or less immobile in the upper strata for a while, but a constant tendency is found to revert ultimately to lower levels.

Much might be said concerning the factors making for growth. A superficial study of those elements tending to rise seems to indicate the presence of such attributes as strength, intelligence, industry and virtue. Perhaps the generation of energy on the part of the individual is of first importance. If we break down the behavior of the individual into its elementary dynamics we find first a striving on the physiologic level. This has to do with the basic and more or less automatic factors in life. These are carried out quite unconsciously and, of course, are purely selfish. To a lesser extent, human behavior is conditioned by social pressure. Such factors as morality, prudence and

cautiousness tend to be in this social category, and, therefore, are to quite an extent dependent on indoctrination. Lastly, a greater or less amount of intellectual guidance tends to modify and direct the operation of the two former forces. Here again, people differ in the basic physiologic drives im-

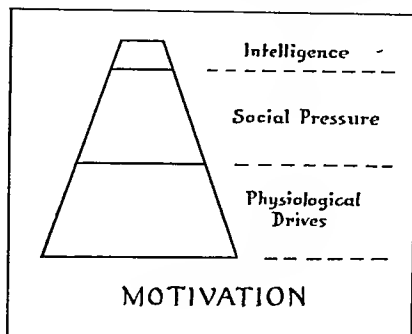


FIGURE 6.

The driving forces behind human behavior are the automatic or physiologic instincts varying with individuals; the sociologic component is that part of human behavior which responds to social pressure and hence is subject to indoctrination, and last, if not least, is the intellectual force.

pulling them forward. They also differ in their responsiveness to social pressure, and, lastly, they vary tremendously in intellectual equipment.

There is still much work to be done in understanding the factors of social mobility, but it is possible to study the composition of the relatively immobile sedimentary elements in society because such persons tend to come under public scrutiny, and their misfortunes become matters of public record. A gross-specimen view seems to indicate an almost pure culture of social disease at the base of the social cone. They have been classified by state departments and institutions through the administrative officers of society as the sick, the poor and the bad. It is true that we find sickness, poverty and crime throughout the whole of society. The sediment differs largely in that it is quite a pure culture of these evidences of social sickness. If we examine these categories a little closer we find a marked degree of overlapping among them. The sick are often impoverished,¹⁻³ the poor are often bad, and vice versa. I have been told that 68 per cent of the people admitted to a large poorhouse had previously been in jail. Large percentages of criminals are known to have ill health, and the whole realm of disease is often closely related to the other disabilities.

Until recently a large municipal hospital would not accept cases of venereal disease to its wards. So that all we can say of these three groups is that certain individuals are preponderantly sick, and, therefore, their illness is what calls for first attention. The others are preponderantly poor or bad. In the field of etiology, their difficulties

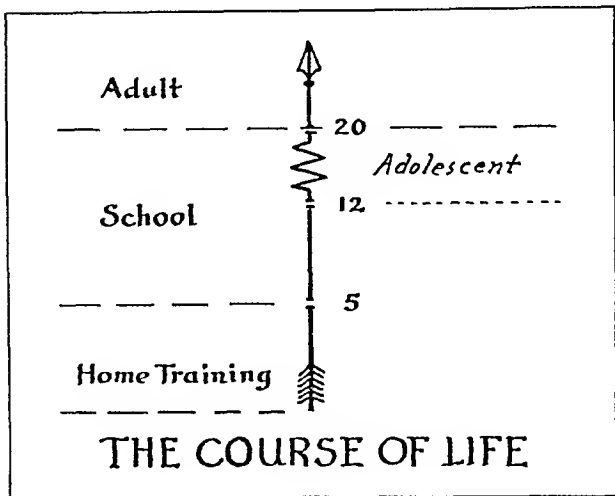


FIGURE 7.

This diagram shows the chronologic application of the forces indicated in Figure 6. The physiologic instinct is more overwhelming in childhood, and the problem of training young children has largely to do with conditioning physiologic responses. The later period of school is the time for indoctrination and the application of social pressures. A period of chaos is indicated during the turmoil of adolescence. Lastly, during adult life the intellect is supposed to take over more or less direction of these earlier basic factors.

appear to spring from the same sources. They all tend to be handicapped, each one with a large medical component. Therefore, it seems axiomatic that medicine cannot serve with maximum social benefit without taking cognizance of these matters. Furthermore, the terms sick, poor and bad are all relative. We can represent their degree as with a thermometer. At the top it is generally recognized as hot, at the bottom as cold, and yet the exact position where cold ceases and hot begins is relative. If one goes from a room with a temperature of twenty into a room at fifty, he says it is warm. Yet if he had previously been in a room with a temperature of seventy, it would seem cold. Likewise, there is no level at which one may be said to be good or bad, rich or poor, well or sick. For this reason it would seem fallacious to be too arbitrary in setting standards. A person with psoriasis may be said to have a chronic, incurable disease, yet he may suffer very little disability from it. Similar observations might be made concerning the poor and the bad.

The number of dependents in a community is

a variable that fluctuates between certain levels. Under natural law, during prosperous times, all stratum of society are benefited, even the insane. Likewise, during bad times all suffer. Those at the upper levels, of course, have more fat on which to live, and, therefore, suffer less in the essential matters. Bad times usually lead to remedial efforts on the part of society to alleviate the suffering of those whose situation is most desperate. Although in theory, the roof of the relief load is governed by the necessities of the individual, in practice, dependency is artificially expanded. The tendency to exploit is not peculiar to any class of people, but is a component of every person. Normally, during hard times, social necessity creates a pressure, which induces the less well endowed to work harder at longer hours and lower wages. It may be well for government acting as a referee to see to it that such persons are not exploited by their stronger fellows. How-

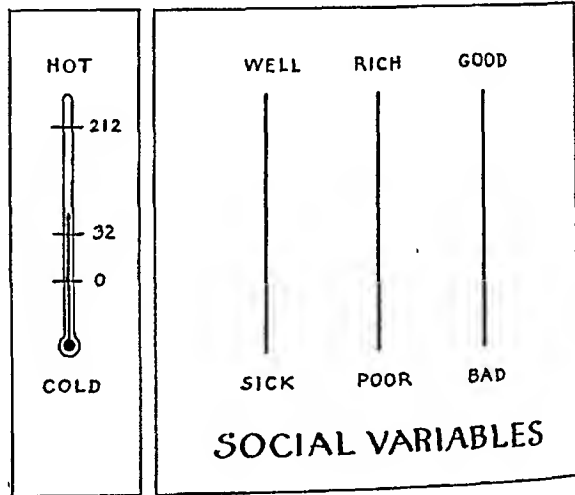


FIGURE 8.

Heat and cold are variables, and there is no point where one can arbitrarily divide temperature sense into hot or cold. Likewise, health and economic and moral statuses are variables for which it is difficult or impossible to set arbitrary standards.

ever, if such attempts, carried out horizontally, are too beneficent, there is apparently no limit to the rising height of the relief load. When the relief load becomes large enough, it too becomes the object of exploit by politicians, social workers and government officials. The politician exploits the distress of these people for purposes of votes, the social worker and government official because the size of their jobs tends to enhance their prestige as well as to increase their salaries. Incidentally, the same factor of growth enters this situation if those having charge of dependent groups happen to be successful promoters, and the growth of the individual and of the problem takes place

hermore, there is some ground
futile to set an arbitrary stand-
ard, the use of the word "stand-

There can be an average
but there can be no standard arbi-

because of individual differences. What

gives a pittance to one man is like a fortune to
another. There has recently appeared a discus-
sion of this problem in which it was stated that 66
per cent of the population were living on a sub-
standard basis.¹⁰ This is like saying that the aver-
age is below the average. It may be a mistaken
kindness on the part of those in the upper level
to set the satisfactory level of living at a point
higher than that at which 66 per cent of the peo-
ple can sustain themselves. Furthermore, this im-
mediately provokes the question: Can a minority
of the people sustain a majority at a level of living
higher than they are able and willing to sustain
themselves? If the answer to this question is, Yes,
another question is immediately provoked: How
small a minority of the people can sustain how

THE CHILD

The child is a relatively helpless person. Where-
ever evidence of social disease is found, there is
always an excess of children. The law does not
recognize the child as legally competent until he
is twenty-one years old. He cannot vote, hold
title to real estate, inherit property, incur debts
or marry. Thus, we have the traditional depend-
ence and incapacity of the child, and among the
first efforts in the field of social welfare were
attempts to protect children.

Population studies¹¹ estimate about 35 per cent
of the inhabitants of Massachusetts as under twen-
ty-one years of age. This would place the num-
ber at approximately one and a half million.
General health measures appear to be fairly well
organized, and tremendous strides have been made
in control of infectious disease. However, there
are social responsibilities that it is imperative to
recognize in connection with children. Some have
competent but many have incompetent parents.
The doctor certainly has responsibility in this
field. In the first place, he brings the child into
the world. He treats the various ills to which chil-
dren are peculiarly susceptible, and, in matters
of nutrition and growth, he takes the initiative
and leadership, frequently being obliged to hold
parents to their task. In the field of immuniza-
tion the individual doctor has not taken so much
initiative as might be desired. Who could better
participate in the education and training of the
child than the one who has had so much to do
with the other phases of his upbringing? There
is a tendency on the part of parents to make pets
of their children, and to be lax in the discipli-
nary requirements of their training. The devel-
opment of inferiority and paranoid reactions may
well be the result of parental bias and leads to
unhealthy attitudes of mind.¹² Thom¹³ has many
times shown the relation between faulty habits
in young children and later maladaptations. So
much has been said concerning this matter that
it hardly seems necessary to reiterate. Further-
more, from time immemorial the minds of young
people have been prepared for the struggles and
vicissitudes of adult life by the promulgation of
certain attitudes. The competitive elements in
school marks, organized play and other attain-
ments may be used in such a way as to be very
helpful, or they may be exploited to the injury
of growing children. The doctor should not as-
sume these tasks alone, but should do his share
along with parents, religionists and teachers.¹⁴ For-
tunately, the majority of children are only tem-
porarily incapacitated, for, with the development

TABLE 1 *Groups of Handicapped People in Massachusetts*

CLASSIFICATION	NO. OF PERSONS
Population of Massachusetts (1940)	4,316,211
Aided by private charity	1,743,863
Aided by State and towns	631,556
Aided by Boston Community Chest (1940)	400,000
Employed by WPA	82,000
Arrests (1939)	209,343
Admitted to penal institutions (1938)	15,000
Under care of Veterans Bureau (1940)	1,104
Under care of Department of Mental Health (1940)	26,000
Estimated incidence of feeble-mindedness (2 per cent)	86,000
Estimated incidence of chronic disease	500,000
Estimated incidence of physical defects (3.1 per cent)	124,000
Admitted to hospitals (1940)	424,551

large a majority at a level higher than they are
willing and able to sustain themselves? To be
sure, this seems simple enough to the levelers
through the field of taxation. However, in the
imperfect state of the human mind at the present
time, it appears that there is a point in taxation
for the purpose of assisting the less well endowed
at which the better endowed is discouraged or, at
any rate, deterred and inhibited in his capacity
to grow, thus invoking the law of diminishing
returns. Society cannot lift itself by the boot-
straps any more than the individual can.

To present more specifically the problem of med-
icine concerning these matters, it seems appro-
priate to break the groups down further and set
them up in new categories as follows: the child,
the aged, handicapped classes, the insane, the
feeble-minded, the neurotic, the disordered person-
alities, drug and alcohol addicts, and the physically
diseased.

of maturity, they soon emerge from the sedimentary stratum and take their place at whatever level in the social scale their capacity to grow places them.

THE AGED

At the end of the scale we have the aged. Much has been written and said concerning the ever-increasing number of the aged. It is estimated that at the present time about 8 per cent of the population is over sixty years of age.¹² This gives a population of approximately 350,000 old people in Massachusetts. We do not know how many of these are dependent or what they are doing. Some 80,000 are receiving old-age assistance, and the number is increasing each year. Many new bills are before the Legislature to lower the age of eligibility and to increase the amount paid to each person. Much that has been said concerning the situation of the child might apply with equal appropriateness to the aged. Likewise, conditions make it increasingly difficult for the aged to support themselves in ordinary competition with young, vigorous persons. They are more susceptible to illness, probably more prone to accident, and in many ways a greater liability than younger people. The grant of a special form of relief to the aged has tended to weaken the pressure on children to care for their parents, and has likewise reduced the incentive on the part of the older persons to carry on. Innumerable private institutions have grown up depending on the helplessness of these aged persons for their support. They are also particularly vulnerable to exploit.

Medicine must shoulder its share of the responsibility for the care of this group, and should furnish leadership in the field of social engineering as applied to the aged. Obviously, if they were all pensioned, the cost would be almost prohibitive. It also seems true that the vast majority of older persons would be happier pursuing some gainful occupation, and maintaining thereby their self-respect and dignity. There is a great disproportion between chronologic and physiologic age about which more should be known. Certainly a program for aged persons, preventing the indignities and deprivations of neglect, guarding against exploitation, and yet giving them an opportunity for a full, satisfying life commensurate with their abilities, needs the medical profession badly. The beginning of a specialty of geriatrics augurs well for the future.¹⁵ When an aged person is found in the sedimentary zone of society he is usually there for good, and most of the aged grow increasingly unable to support themselves at levels above dependency.

HANDICAPPED CLASSES

There are many groups in our society against whom great odds are arrayed.

Approximately half the population of Massachusetts is female. Ordinarily, but 25 per cent pursue gainful occupations.¹⁶ They are susceptible to certain disabilities not common to males. When they work they receive a smaller salary, and are still quite dependent on male initiative to keep their status in society. For this reason, the capacity of the female to grow is limited as compared with the male, and they are therefore found in certain dependent positions out of proportion to their occurrence in society. This has been recognized by the provision for mothers' aid.

More than half the population of Massachusetts are foreign born. Coming to our shores from a foreign land has been a great stimulus to certain persons. By hard work, long hours and low wages they have advanced their status till at the present moment our colleges are literally overflowing with the children of immigrants. Alas, so are our prisons.¹⁷ Here again, competition is not even. The foreign born tend to receive lower wages than the American born and have less education. They are found out of proportion to their incidence in society in prisons, hospitals and poorhouses. An equal degree of success by a foreign-born person means greater ability, strength or industry. When they fail, they lack the resources to carry on and are consequently found in a sedimentary nonmobile stratum in excess to native born.

The Negro, largely by virtue of the amount of pigment in his skin, is a handicapped person in our state. When 25.9 per cent of the native white population of Massachusetts were unemployed, 33.9 per cent of the Negroes were out of work.¹⁸ They are found in hospitals and other institutions out of proportion to their incidence in society. Of a certain class of criminals admitted to the Charlestown State Prison, 10 per cent are colored, whereas their incidence in the general population of the state is but slightly over 1 per cent.¹⁹ This tends to place them at a lower level in society, to concentrate them in squalid districts, and thus increases their susceptibility to poverty, disease and vice.²⁰

Good social engineering on the part of the medical profession cannot equalize the opportunity for all, but it can recognize the situation and do its part toward a rational program for prevention and cure.

THE INSANE

Nobody knows how many insane there are. The only figures we have are state hospital admissions, but there is ample evidence of the wide distribution of mental disease throughout all strata of society. Those of us who are practicing psychiatry in the city, and attending large clinics, are in daily contact with a considerable number of persons with definite mental disease, yet of such a nature that their families are able to care for them. This applies particularly to the aged and to persons with mild depressive psychoses. Many of the inmates of nursing homes and sanatoriums are technically insane, although not carried on the books as such.

In the early days of our state hospital system, a hope was set forth that, if persons with mental disease could be brought in earlier and would stay longer, as high as 84 per cent of them could be cured.²¹ Upon this hope, to some extent, the state hospital system has developed until we now have approximately 30,000 under care in Massachusetts. Some have recoverable diseases, and their ultimate discharge can be predicted at the time of admission, but with the vast majority we are dealing with deteriorating processes, and they are looked on largely as problems for custodial care. Once the burden has been lifted, the family is very loath to assume it again. The only limit to the state hospital load up to the present time is the number of beds available.

This problem first of all calls for investigation. Already there appears to be some diminution in the number of persons developing mental disease because of syphilis, but this barely touches the surface. The state hospital system has already been expanded to a point where great resistance toward its further extension is met from tax-minded people. It has been suggested that a considerable number of inmates at present in state hospitals could be cared for in the community under proper supervision.²² For a number of years people have been encouraged, and almost exhorted, to send patients to hospitals for mental disease early. Perhaps we are reaching a stage where some selection must be made, and the medical profession must equip itself to supervise intelligently large numbers of persons with mental disease in the homes of the community. It is obvious that the vast majority of persons with frank mental disease are thoroughly disabled and bound to be in the sedimentary stratum of society.

THE FEEBLEMINDED

Certain children do not develop intellectually and are called feeble-minded. There may be some

debate as to exactly the level of intelligence that should stamp one as feeble-minded, but the helplessness of this group is universally recognized. Conservative estimates place the number of feeble-minded in Massachusetts at around 2 per cent. If this is true, there are at least 86,000 feeble-minded in Massachusetts. Approximately 5000 of these are in institutions for the feeble-minded. One hundred years ago, a beginning was made toward training the feeble-minded, the idea being that with special training they would develop and take their place as normal citizens. Unfortunately, this fond hope has not been realized. The number in the institutions, as set forth in a recent study,²³ indicates an ever increasing age and a diminished discharge rate. At the present time 57 per cent of the population of the schools are over twenty years of age, that is, beyond the age at which education is usually successful even in healthy persons. This report, which is the latest statement concerning the problem of the feeble-minded in Massachusetts, makes no attempt to solve it but ends with a fervent plea for one more institution. If the proponents of this measure should be successful, the total result would be that instead of their being 81,000 feeble-minded abroad in the community, there would be 79,000. This does not seem a sufficient end. Here is a challenge to the medical profession. At the present moment, we have little to offer between 100 per cent incarceration in a school for the feeble-minded and 100 per cent neglect in the community.

Although the general helplessness of the feeble-minded is recognized, they are held up to many responsibilities. They are entitled to vote and to buy liquor, and are called on to support themselves. The average doctor pays little attention to this group. There are some whose parents are thoroughly competent and able to protect and provide for them, but the vast majority are turned loose and do much to augment our social perplexities. The number of feeble-minded in jails, poorhouses and hospitals is proportionately large. When the physician is consulted, he shakes his head, speaks vaguely of the state schools and their overcrowding, and often has little more to offer.

Now there is a level at which many of the feeble-minded can lead independent lives.^{24, 25} In fact, of all those discharged from the state schools 15 per cent are considered capable of self support, and 14 per cent are capable of partial self support. Perhaps, the group sent to the school tend to be the more troublesome cases.

Certain developments in society during the past few years have made it increasingly difficult for

handicapped persons to pursue gainful occupations. These militate particularly against the feeble-minded, and may therefore be discussed here. In the first place, the change from an agrarian and rural to an urban community presents problems. Eighty-nine per cent of the population of Massachusetts now dwells in cities. The transition from large, independent households to tenement dwellers makes it increasingly difficult for a family to develop the talents of a feeble-minded person, and especially, the field for productive labor on the family farm is well-nigh closed. Likewise, the control of certain people by workers' organizations tends to exclude the feeble-minded and other handicapped persons. Again, the setting of a minimum wage tends to exclude those who are not competent to earn that wage.

To raise the standard of living of certain of the lower strata of society, ignoring the element of handicap among such persons, minimum-wage laws have been set up. It has been perhaps rather naïvely hypothesized that if a minimum wage was set in an industry the lower elements in society would be more or less automatically introduced to a higher scale of living. I have been unable to procure extensive data on this matter, which would seem to be elementary, and yet there is some reason to suppose that the setting of a minimum wage automatically discharges those persons who are not competent to earn this wage, thereby lowering their scale of living—in fact, reducing them to a welfare level, the jobs at higher wages being taken by persons coming in from horizontal positions who are capable of earning this wage. This is an example of an attempt to solve a social problem on theoretical grounds without adequate preliminary research. Lastly, the carrying of insurance against industrial accidents has led to a medical examination of applicants for jobs, and thereby tends to exclude any who may be considered accident prone. All these things have limited the fields of endeavor open to handicapped persons, especially the feeble-minded.

The medical profession should furnish leadership in providing for the approximate 80,000 non-institutionalized feeble-minded. Obviously, it is futile to think of institutional care for this vast throng for the reasons given above. The feeble-minded tend to constitute a substantial part of the immobile elements in society, remaining a more or less permanent part of the sedimentary stratum and furnishing more than their share of disease, poverty and crime.

THE NEUROTIC

Wherever large numbers of sick persons are found, there is an enormous amount of functional nervous disease. Estimates in large clinics, and in general practice, have run as high as 35 per cent.²⁶ This group is ill-defined. Gradually medicine has come to look on their trouble as in the emotional field, yet they run the gamut of clinics, have many operations, and are a very great load on organized medicine. If wealthy, they are received enthusiastically by the practicing physician, but they are looked on with consternation in the free clinics. Their difficulty is perhaps situational to some extent, and many of them appear to be mixed medical and social problems. Welfare lists contain the names of many persons who at one moment are considered malingerers, and another as afflicted with some physical disease. Although many psychologic and physiologic studies have been made on this group in the last few years, there are still inadequate data as to the natural history of such illnesses, and we are still lacking a good statement as to their place in the whole medical scheme of things. These illnesses tend to be chronic and disabling, and therefore frequently place their victims in the dependent group.

THE DISORDERED PERSONALITIES

This group occupies a vague zone in the social hierarchy and is still ill-defined by the medical profession. It has to do with those persons who, through personal peculiarities, are unable to adjust and adapt themselves to the requirements of society, and so become social problems in one way or another. The morbidly contentious find it difficult to obtain employment. They are continually agitating, and nobody wants them. They are frequently found on relief, in prisons and even in hospitals for the insane. The inadequate personality often gives up without a struggle and is feebly resistant to alcohol, and the emotionally unstable are often incapable of sustained productive effort. This group not only forms an important component in definite social disorders, but makes up a large number of those who are found in clinics appearing on the surface as neurotic. Needless to say, many of these persons appear in the sedimentary stratum.

Psychiatrists have expressed a belief that if these individuals were properly handled as children much of their difficulty in adult life might be avoided. Whether this is true, experience alone can tell. Nevertheless, it is true that the under-

standing physician who has an attitude of detachment is a great help in handling such cases. There is a place for each one of these people in society, if such a place can be found, but without skilled advice and understanding, they form one of the most turbulent and distressing factions with which we have to deal. There is no estimate of their number except to say that it is very large. One study set the percentage of the inmates of a large prison to be classified as personality disorders as very high.

DRUG AND ALCOHOL ADDICTION

Addiction to habit-forming drugs, including alcohol, has long been considered a medical problem, and, in the past, there have been many programs under medical stimulus and leadership attempting to attack this problem in an intelligent way. We have no census of alcoholic patients, but every index tends to show the load to be tremendous. There are approximately 84,863 arrests in Massachusetts every year for drunkenness.¹⁷ Thirty-two per cent of the patients admitted to the state hospitals are said to be intemperate.²⁷ Alcoholism has been shown to be a very large component in the admissions to the Boston City Hospital.²⁸

There is no more discouraging problem with which to deal than that of alcoholism. The police handle the same cases over and over again. Certain persons have literally hundreds of sentences to jails and houses of correction. At the present moment, although there has been very recently a vigorous attempt to promote attention to this group, there is no state-wide program for prevention or cure, nor is there an adequate meeting of the minds of police, welfare and medical authorities. Quite a bit of the beneficent effort to raise the level of living of certain of the dependent groups is almost entirely vitiated through diversion of relief from the home to the saloon.

The drug problem is similar, but, of course, very much less flagrant. A surprising number of those who fail to meet their obligations in life are alcoholic and get into the sedimentary immobile stratum of society.

THE PHYSICALLY DISEASED

I shall not attempt a wide discussion of the social problems of the physically ill, since much has been written on this subject of late. There are many data to indicate a greater incidence of disease among persons in the low-income groups. There has been a suggestion from some sources that ill health is due to inadequate medical care. This is a glorious tribute to the efficacy of medical

practice, but has little basis in fact. It is well known that much of the reduction in disease has been due to sanitary measures, and that a relatively small amount has been due to curative medicine. Sanitation is almost entirely, at the present time, in the hands of the government, and the work of the practicing physician is largely in the field of curative medicine. However, there is a social component in the realm of physical disease that offers adventure in a somewhat new field.

It is estimated that 39 per cent of the population have some form of chronic disease that is disabling.^{29, 30} Likewise, it is estimated that 3.1 per cent of the population are crippled to a point of being disabled.³¹ Then, the blind and the deaf should be added to this total. As with the others, modern social trends have militated against the possibility that these individuals will sustain themselves, and it has tended to make the problem social as well as medical. The well-known tendency of certain persons with minor disabilities to exploit their illness as a means of gain should be noted. The rehabilitation of disabled persons, the organization of co-operative workshops where they may pursue some sort of gainful occupation, and the breaking down of prejudice, as well as the keeping up of the morale of handicapped persons, need medical participation.

One important group is that of the epileptic. It is estimated that 0.17 per cent of the population have occasional convulsions. Recent developments have shown that a large number of epileptics can be kept symptom-free under medication. The others find it difficult to sustain themselves and need great ingenuity in planning special programs.

The attitude of different persons toward disease is a well-known variable. One person losing a phalanx on the fifth finger tends to exploit this disability and retire from active duty, whereas another person puts off until too long, cutting down on vigorous effort.

* * *

From the above it would appear that throughout Nature there is a tendency on the part of individuals to form themselves into a social hierarchy according to their capacity. Likewise, there is a level at which survival is precarious. In human society, the destruction of the less capable is prevented by the efforts of the more capable. The least capable are handicapped by sickness, poverty and vice, and it is the task of organized society to care for them.

This is, in the main, a clinical problem calling for the use of the scientific method, that is, the method of diagnosis as a preliminary step to

treatment. There are extensive and intensive methods by which the problem can be attacked, analogous to sanitation and salvage in medicine. The medical profession has great opportunities as well as obligations in dealing with these matters since a professional personnel trained in scientific methods is available, and since, because of overlapping between these groups, it is inevitable that physicians participate in the solution of these problems.

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REFERENCES

1. Cannon, W. B. *The Wisdom of the Body*. 312 pp. New York: W. W. Norton & Co., 1932.
2. Darwin, C. R. *The Descent of Man*. In 2 vol. 845 pp. New York: D. Appleton and Co., 1871.
3. Spengler, O. *Decline of the West*. Translated by C. F. Atkinson. 443 pp. New York: Alfred A. Knopf, 1926.
4. Sorokin, P. A. *Social and Cultural Dynamics*. In 3 vol. 2108 pp. New York: American Book Co., 1937.
5. Veblen, T. *The Theory of the Leisure Class*. 412 pp. New York: Vanguard Press, 1926.
6. Sorokin, P. A. *Social Mobility*. 559 pp. New York: Harper & Brothers, 1927.
7. Craster, C. V. and Haskin, A. H. Medical aspects of unemployable client for relief. *J. A. M. A.* 116:1897-1899, 1941.
8. Donaldson, W. F. Officers' Department. *Pennsylvania M. J.* 44:495-497, 1941.
9. *Social Statistics by Census Tracts in Boston: A method of neighborhood study*. 31 pp. Boston: Boston Council of Social Agencies, 1933.
10. Bartlett, J. *Social Action: Why and how*. 32 pp. Boston: Young People's Religious Union, 1940.

11. Thompson, W. G. Population trends and programs of social welfare. *Milbank Mem. Fund Quart.* 18:9-17, 1940.
12. Campbell, C. M. Selective service and psychiatric issues. *J. A. M. A.* 116:1883-1887, 1941.
13. Thom, D. A. *Everyday Problems of the Everyday Child*. 349 pp. New York: D. Appleton and Co., 1927.
14. Sweet, C., Jacobus, L. R. and Stafford, H. E. The child-parent relationship: the child in the family. *J. A. M. A.* 116:38-43, 1941.
15. Stieglitz, E. J. Potentialities of preventive geriatrics. *New Eng. J. Med.* (in press).
16. *Fifteenth Census of the United States, 1930*. Population, Vol. IV. 1796 pp. Washington: Government Printing Office, 1933. P. 687.
17. *Annual Report of the Commissioner of Correction*. 175 pp. Public Document No. 115, Commonwealth of Massachusetts, for the year ending December 31, 1939.
18. *Report on the Census of Unemployment in Massachusetts as of January 2, 1934*. 202 pp. Public Document No. 15, Commonwealth of Massachusetts.
19. Stearns, A. W. Homicide in Massachusetts. *Am. J. Psychiat.* 4:725-749, 1925.
20. *Social Statistics by Census Tracts in Boston*. Vol. II. 27 pp. Boston: Boston Council of Social Agencies, 1935. P. 14.
21. *Fourth Annual Report of the Trustees of the State Lunatic Asylum at Worcester*. 71 pp. Boston: Dutton & Wentworth, 1837.
22. Pollock, H. M. *Family Care of Mental Patients*. 247 pp. Utica: State Hospitals Press, 1936.
23. Gruener, J. R. *Feeble-minded Children as a Massachusetts Problem*. 63 pp. Boston: Massachusetts Child Council, 1941.
24. *Report of the Mental Deficiency Committee*. 509 pp. London: His Majesty's Stationery Office, 1939.
25. Dayton, N. A. and Nugent, M. A. Community supervision of mental defectives in Massachusetts. *New Eng. J. Med.* (in press).
26. Pratt, J. H. The influence of emotions in the causation and cure of psychoneuroses. *Internat. Clin.* 4:1-16, 1934.
27. Dayton, N. A. *New Facts on Mental Disorders*. 486 pp. Springfield, Illinois: Charles C Thomas, 1940.
28. Moore, M. and Gray, M. G. Alcoholism at the Boston City Hospital. *New Eng. J. Med.* 221:45-61, 1939.
29. Bigelow, G. H. and Lombard, H. L. *Cancer and Other Chronic Diseases in Massachusetts*. 355 pp. Boston: Houghton Mifflin Co., 1933.
30. Boas, E. P. *The Unseen Plague: Chronic disease*. 121 pp. New York: J. J. Augustin Inc., 1940.
31. Lynch, D. L. Employment of physically handicapped. *J. A. M. A.* 116:1380-1383, 1941.

OBSERVATIONS AND SUGGESTIONS CONCERNING NEUROPSYCHIATRIC EXAMINATIONS FOR THE ARMY OF THE UNITED STATES*

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SINCE August 27, 1940, a modified state of national emergency has existed in the United States.¹ Under the circumstances, it has become necessary for large numbers of young men to enter the Army of the United States. All candidates for the Army are subjected to various examinations to eliminate those who are unfit for military service. One of the most important of the examinations is the neuropsychiatric evaluation of the candidate.

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A review of the neuropsychiatric problems during World War I may suggest the magnitude of the present problem.²⁻⁶ In 1916, just before the entry of this country into the war, one tenth of all discharges from the Regular Army were for neuropsychiatric disorders. This discharge rate was three times that of the hospital admission rate of the adult population of New York State for the same disorders.³ In 1917 and 1918, 3,500,000 soldiers who had been passed by local examining boards and admitted to the Army subsequently underwent special examination. Almost 2 per cent (69,394) of these men were found to be suffering from neuropsychiatric disabilities.⁴ What is more significant is that 96 per cent of these disabilities were considered to have arisen *not* in the line of duty. Available data on 50,000 of these men revealed that 85 per cent began their neuropsychiatric disorder at least five years before entering federal service. Forty per cent (27,000) were detected during preliminary physical examinations in the Army after having been

passed by their local examining boards. Thirty-two per cent (22,000) were revealed by consultation with medical officers of their units, and 24 per cent (16,000) were discovered by their commanding officers. Unfortunately, many officers were commissioned who later proved to have nervous and mental defects. The total 69,394 cases were divided as follows: mental deficiency, 31 per cent; neurosis, 17 per cent; psychosis, 11 per cent; nervous disease and injury, 10 per cent; epilepsy, 9 per cent; "constitutional psychopathic inferiority," 9 per cent; endocrinopathy, 7 per cent; drug and alcohol addiction, 6 per cent.⁴ During the war, all groups constituted a major problem. After the war, psychoses became the major problem. In March, 1921, 70 per cent of all neuropsychiatric cases under observation were psychoses. By 1927 almost 50 per cent of all patients receiving hospital treatment as beneficiaries of the United States Veterans Bureau were neuropsychiatric cases.⁵ It has been estimated that each such case has cost approximately \$30,000 to date.

These are the conditions resulting from the examinations of 1917 and 1918. Since then an appreciation of neuropsychiatric principles and practice has become more widespread in military circles. Unfortunately, the rigors of warfare have increased with advancing knowledge. Military service today demands more emotional stability and intellectual activity than ever before. The coordination of the soldier is of vital importance in these days of carefully synchronized mechanical operations. Equally important is his ability to act intelligently and with initiative in small independent units. Therefore, the demands on the neuropsychiatrist have increased proportionately.

The duty of the neuropsychiatric examiner is multiple. First, he must eliminate those who, because of demonstrable organic or less clearly defined functional abnormalities of the nervous system, are unable to perform their appointed tasks. Secondly, he should ascertain whether the candidate is vocationally fit for the duties of a modern soldier. Finally, he is asked to consider whether the candidate will remain useful during his ten years' reserve duty following the initial training period. This is no simple task. Careful scrutiny of each candidate is required. At least one hour is necessary to perform a reasonably adequate personality estimate. The present emergency demands examination of large numbers of men. Hence, it is impossible to maintain the usual standards of neuropsychiatric examination. Because of the present emergency a compromise must be made.

When it is realized that the general practitioner of the local selective-service board is allotted approximately thirty minutes for a complete examination and the specialist on the induction board from five to ten minutes for neuropsychiatric evaluation, the task seems insurmountable; fortunately, it is not. A reasonable compromise may be reached between perfection and failure to fulfill the purpose of the examination. Bearing in mind the existence of a national emergency and the present organization of the mobilization system, the results obtained under these circumstances have suggested methods whereby such a compromise can be reached. It is the purpose of this article to present observations and suggestions derived therefrom, based on the examination of 5550 candidates from the Fourth Recruiting District (Boston Area). These included 4393 selective-service candidates, 750 National Guardsmen and 407 recruits for the Regular Army.

Under the present system of mobilization there are three channels through which the Army is rapidly increasing its man power (Fig. 1). The first is by means of enlistment in the Regular Army. Except for potential pilots in the air force, medical specialists are not routinely employed for the examination of candidates before induction into the Regular Army. Enlisted recruits are examined by officers of the Army Medical Corps. There is no examination by a neuropsychiatrist. Examination of recruits for the Regular Army has not revealed a significant proportion of neuropsychiatric disorders. Within the last six months, one of us (G. O. P.), together with two other officers of the Army Medical Corps, examined, among others, a group of 407 recruits from the Boston Area. None of the examining officers had received special instruction in neuropsychiatry. They rejected 0.7 per cent of the recruits for neuropsychiatric disabilities. Three months later 405 volunteers were examined by the neuropsychiatrists of the Boston Area Induction Board. The rejection rate for neuropsychiatric disorders in this group was 3.2 per cent. The two classes of volunteers were in the same age, racial, social and geographic groups. They differed in that the men in the second class had been pronounced normal in all respects by the examiners of the local boards whereas those in the first were entirely unselected. It is to be expected that fewer neuropsychiatric disorders would be present in the latter (selected) group of candidates. Nevertheless, trained neuropsychiatrists discovered approximately five times as many neuropsychiatric disorders. Similar examination of applicants for the Regular Army by

trained neuropsychiatrists might uncover neuro-pathic or psychopathic traits in many of the applicants who are now accepted for service.

The second channel of entry into the Army is by induction of National Guard units. National guardsmen have received a general physical ex-

may be specialists. During recent inductions of National Guard units an appreciable amount of disability was discovered by the medical induction boards. One such board inducing Massachusetts units was composed of nine examining officers, one of whom happened to be a neuro-

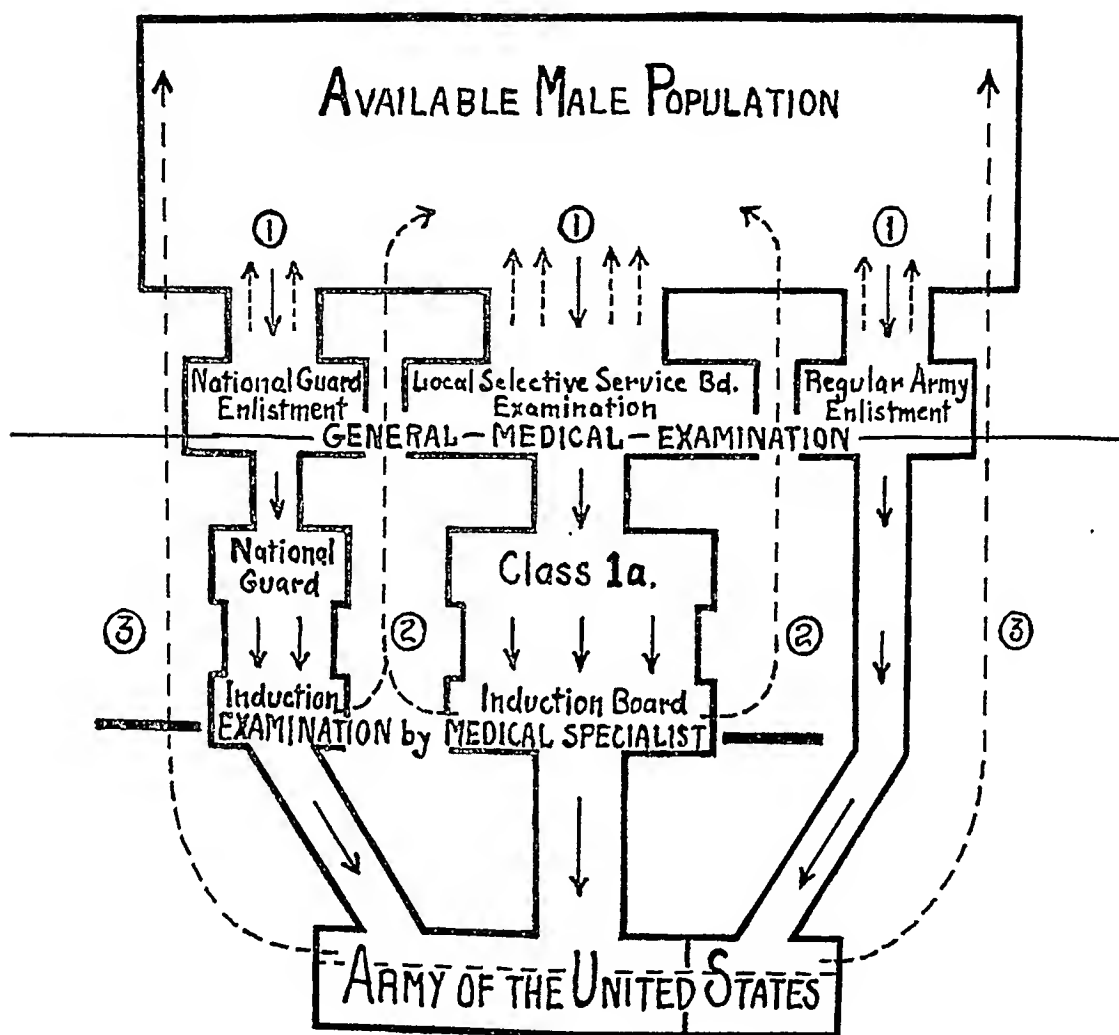


FIGURE 1. Channels of Entry into the Army of the United States.

- (1) Selection of candidates by means of general medical examination by local practitioners.
- (2) Further selection of candidates through induction-board examinations by medical specialists, including examination by neuropsychiatrist.
- (3) Further examination and rejection, if necessary, without benefit of governmental care and treatment, for neuropsychiatric disabilities incurred before entrance into the Army or within the first six months after entrance.¹⁰

Members of the Regular Army constitute a separate unit within but not a part of the Army of the United States.

amination before admission into their units. Here again, medical specialists are not routinely employed for the detection of disabilities. On the other hand, the men have been subject to scrutiny by their officers during their training periods. This constitutes an additional opportunity for detecting gross disabilities. Finally, before induction into the Army, the guardsmen are subjected to examination by a medical board some of whose members

psychiatrist (M. J. F.). The latter interviewed approximately 750 men in seven days, or slightly over 100 men per day. Although an experienced and qualified neuropsychiatrist, he was able to make no more than a cursory evaluation of each candidate. Even under these conditions a percentage of 0.8 of rejectable neuropsychiatric disabilities was uncovered. Thus a single experienced specialist was able to discover the same

amount of neuropsychiatric disorders in a group of previously examined men as had been uncovered by three general practitioners in an unselected group (Regular Army recruits). It is probable that more careful examination of the National Guard group might have revealed additional disabilities.

The third and largest portal of entry into the Army is through the Selective Service Act of September 16, 1940. A man who is called for service is subject to the following routine: investigation of social and occupational status; call for examination according to his order number; general physical examination by the medical examiner of the local selective service board; reference of the candidate to a medical advisory board for consultation in doubtful cases; examination by an induction board of medical specialists if the candidate is placed in Class 1-A by the local board, acceptance or rejection by the induction board for general active military service, if the candidate is rejected, return to the local board for reclassification or for re-examination by a medical advisory board; possible return to the induction board if placed in Class 1-A by the advisory board.

There are approximately 6400 local selective-service boards in the United States. There are 173 in Massachusetts. The medical examinations for these boards are performed by local general practitioners, surgeons or internists as a gratuitous, voluntary service. The presence of specialists on such boards is unusual. By March 1, 1941, 457 physicians had been appointed to these boards in Massachusetts. There are from one to five examiners on each board. Each physician examines from three to five men per day when on duty with the board. The number examined varies with the quota of the board in question. Since most of this work must be done in addition to his usual practice, the examiner expends about thirty minutes per candidate. During this time a complete physical examination and personality estimate of the candidate are expected from the examiner. In the neuropsychiatric field especially, this is no trivial task. Judging by the rejection rates maintained by the majority of the local selective service boards in Massachusetts the local examiners are performing an excellent service to the nation. If there is any criticism, it is that additional stress might be placed on the neuropsychiatric aspects of these initial examinations.

The general practitioner on the local board possesses certain advantages over the specialists of the induction boards. The local examiner has more time with each candidate. The alert physi-

cian may learn a great deal about a candidate's personality and background in a half hour interview. Social agencies may be called on to investigate home, school, court, welfare and hospital records, when necessary. Consultations from a medical advisory board are available in doubtful cases. By utilizing their advantages the examiners on local boards are in a position to save both the Government and the candidate a great deal of time, effort, confusion, expense and disappointment.

Medical examination by the local boards is intended to exclude all those who are unfit for general active military service. The criteria for such exclusion are listed in the Mobilization Regulations (M R 19) of August 31, 1940. An analysis of the rejection rates from 124 of the 173 local boards in Massachusetts has shown that from 30 to 87 per cent of the candidates have been rejected for various defects. The average rejection rate is 58.5 per cent. It is estimated that about 9 per cent of the candidates were rejected because of neuropsychiatric disorders.

Medical advisory boards have been organized as a consultation service for the local boards. There is approximately one medical advisory board for every ten local boards, or about 640 in the United States. There are 15 such boards in Massachusetts. The medical advisory boards are composed of a group of outstanding specialists in the community. Their services are offered for consultation on request by the chairmen or examiners of the local boards. Not many men are examined by the neuropsychiatric consultants. Therefore, they are often able to spend several hours or more evaluating the doubtful cases. Electroencephalography, lumbar puncture and other laboratory techniques may be employed by these boards when indicated. Expert neuropsychiatric consultations are made available by these boards. It is probable that, if more such consultations were requested, fewer candidates would be rejected by the induction boards.

The medical induction boards are the final barrier before actual entrance into the Army. There are three such boards in Massachusetts. These are composed of specialists who re-examine all candidates placed in Class 1-A by the local medical examiners. The Boston Area Induction Board, with which this report is primarily concerned, has been active since November 18, 1940. It is composed of a medical director from the Army Medical Corps and his military and civilian assistants. In March, 1941, the civilian advisory component of the board consisted of a clinical pathologist, an oral surgeon, an otolaryngologist, an ophthalmologist, an orthopedic surgeon, a gen-

eral surgeon, a psychometrist, three internists and five neuropsychiatrists. At the beginning, 100 men were examined each day. By February, the number had increased to 250. Approximately 4400 candidates were examined on twenty-two days between November 18, 1940, and February 18, 1941. The results are summarized in Table 1. The

TABLE 1. *Analysis of Rejections by the Boston Area Induction Board.*

	NOVEMBER	JANUARY	FEBRUARY	TOTAL
Candidates examined	405	1254	2746	4405
Candidates rejected	95	257	462	814
Percentage rejected	23.4	20.5	16.8	18.4
Disabilities causing rejection (per cent) —				
Dental	10.8	5.1	3.0	
Ocular	1.7	2.5	1.6	
Ear, nose and throat	1.4	0.9	1.6	
Orthopedic	1.2	1.1	0.3	
Surgical	1.7	1.7	2.1	
Medical	2.7	6.0	1.2	
Clinicopathological	0.2	0.1	0.3	
Neuropsychiatric	3.2	2.8	5.8	4.5
Percentage of total rejections for neuropsychiatric reasons	13.8	13.7	34.5	24.5

neuropsychiatric disorders by reason of which rejection was recommended are listed in Table 2.

TABLE 2. *Neuropsychiatric Rejections by the Boston Area Induction Board among 4405 Candidates.*

DIAGNOSIS	NO OF CASES	PER CENT
Mental deficiency	34	16.2
Manic depressive psychosis	6	2.8
Schizophrenia	3	1.4
Insanity of undetermined type	1	0.4
Constitutional psychopathic inferiority	30	14.3
Schizophrenic personality	14	6.7
Psychoneuroses (all types)	57	27.2
Neurocirculatory asthenia	12	5.7
Undesirable traits (Sect VIII)	2	0.9
Chronic alcoholism	12	5.7
Stammering	1	0.4
Post traumatic syndromes	5	2.3
Fröhlich's syndrome	1	0.4
Cushing's syndrome	1	0.4
Méniere's syndrome	1	0.4
Migraine (incapacitating)	4	1.9
Epilepsy	9	4.2
Multiple sclerosis (?)	7	3.3
Encephalopathy of unknown origin	2	0.9
Neuromuscular atrophy	1	0.4
Neuromuscular paralysis	5	2.3
Sciatica	1	0.4
Total	209	18.18

Because the final decision with regard to rejection or acceptance and also the choice of primary and secondary causes for rejection lies, not with examining specialists, but with the medical director of the board, a further analysis is made in Table 3.

Twenty-seven neuropsychiatrists have been employed on the induction board for from one to three days each week. During February, five were on duty each day. Each neuropsychiatrist examined an average of 50 men per day, varying from 35 to 70 according to the individual capacity

of the examiner. The board sat about five hours each day. Therefore, the average time for examination of each candidate was six minutes. The time for examination varied from three minutes for evaluating a normal candidate to ten or fifteen minutes for considering a doubtful case.

It has been said that the neuropsychiatrists on induction boards should insist on a minimum of fifteen minutes for each candidate.⁷ Under the present induction system this is impossible. Examination of 50 candidates at fifteen minutes apiece would require twelve and a half hours. Since it is necessary to deliver the candidates to the reception center on the day of induction, it has been impossible to expend more than five or six hours each day. Experience has shown that no one neuropsychiatrist can do justice to more than 10 men per hour, or more than 50 a day. To enlarge the neuropsychiatric component of the board might cause an undue strain on those available for such duty. Therefore, the problem of the neuropsychiatrists serving on induction boards is to work out a general scheme that may be varied by each examiner in such a fashion as to produce the most effective evaluation in the least amount of time.

As has been stated, a situation exists in which a compromise must be made between thorough and inadequate neuropsychiatric examination of candidates for the Army of the United States. The foregoing outline of the situation and the results obtained to date have led to certain suggestions whereby a practical solution may be reached. Certain general principles must be kept in mind by all examiners. First, because of the national emergency, individual interests must, for the time being, yield to the collective interests of the nation. Secondly, at the present stage of military expansion, the Army needs men who are sound in mind and body. The common fallacy that "the Army will make a man of Johnny" has no place in the present system. The Army is an organization for the defense of the nation and is not to be considered a corrective institution. Thirdly, there are approximately seventeen million eligible men from whom to choose an army of from two to four million men. Finally, the admission of undesirable candidates to the Army not only decreases the efficiency of this branch of defense but also increases the burden on the nation through support of these men by the Army or the Veterans Bureau.

An estimate should be made to determine whether the candidate is vocationally fit for the life of a modern soldier and whether he is mentally durable. Therefore, it is essential that the

medical examiners of the various boards familiarize themselves, as far as possible, with the essentials of neuropsychiatric evaluations,²⁻⁴ the neuropsychiatric requirements for admission to the Army⁸ and the fundamentals of neuropsychiatric examination.⁹ Important signs of instability are addiction to drugs or alcohol, chronic complaints, gastric neuroses, cardiac anxiety, litigation neuroses, fre-

psychiatrists on advisory boards have expressed the opinion that their services are not requested so frequently as might be expected.

The problem confronting the neuropsychiatrist on the induction board is how to make the best decision in the time allowed. A simple neuropsychiatric interview is appended to this article. This is in no sense an attempt at standardization

TABLE 3 *Neuropsychiatric Abnormalities Noted in Examination by the Boston Area Induction Board of 2511 Candidates February, 1941*

TYPE OF DISORDER	CONSIDERED SUFFICIENT CAUSE FOR REJECTION BY NEUROPSYCHIATRIST		NOT CONSIDERED SUFFICIENT CAUSE FOR REJECTION BY NEUROPSYCHIATRIST		TOTAL
	NO. OF CASES	NO. REJECTED BY INDUCTION BOARD	NO. ACCEPTED BY INDUCTION BOARD	NO. REJECTED BY NEUROPSYCHIATRIST	
Mental deficiency	26	20	6	0	26
Borderline intelligence	1	0	1	11	78
Manic depressive psychosis	8	4	4†	5†	13
Schizophrenia	3	1	2	0	3
Insanity of undetermined origin	1	1	0	0	1
Constitutional psychopathic inferiority	38	28	10	6†	44
Schizophrenic personality	15	10	5	0	15
Psychoneuroses (all types)	64	48	16	25†	89
Neurocirculatory asthenia	11	11	0	0	11
Anomalous instability	0	0	0	2	2
Undesirable traits (See VIII)	1	1	0	0	1
Acute alcoholism	0	0	0	13	13
Chronic alcoholism	20	8	12	14	34
Post-traumatic syndromes	5	5	0	10	15
Cerebral birth injury	0	0	0	1	1
"	1	0	1	0	6
"	6	5	1	0	4
"	0	0	0	4	4
"	0	0	0	4	4
"	0	0	0	5†	5
"	0	0	0	6*	6
"	0	0	0	3	3
"	0	0	0	13	12
"	0	0	0	2	2
Extracranial muscle palsies	0	0	0	4	4
Exophthalmos	0	0	0	2	2
Facial palsies	0	0	0	1	5
Neuromuscular paralyses	4	4	0	1	7
Neuromuscular atrophies	1	0	1†	0	1
Cushing's syndrome	1	1	0	0	1
Fröhlich's syndrome	1	1	0	0	1
Meniere's syndrome	1	1	0†	5†	10
Migraine (severe)	5	3	1	3	4
Headaches (frequent)	1	0	1	5†	15
Epilepsy	10	6	4	13	17
Syncope	3	0	3	1	2
Scoliosis	1	0	1	4	4
Back injury	0	0	0	5	5
Kyphosis and scoliosis	0	0	0	6	7
Stammering	1	1	0	—	—
Totals	245	159	86	19	421

*One of these was rejected by the medical director
†Indicates some question by neuropsychiatrist as to diagnosis

quent change of occupation or residence, easy fatigability, repeatedly poor scholastic record, prolonged enuresis, urinary dribbling, lack of acquaintances, withdrawal from social contacts, fanatic beliefs and overly aloof attitude during examination. Direct questioning regarding head trauma, unconsciousness, convulsions and nervous breakdowns will often reveal disqualifying disorders. Alert observation of the candidate will often lead the examiner to suspect, if not to discover, disabling personality disorders. Whenever such a suspicion arises, a consultation from a medical advisory board is indicated. Several neuro-

of technic, nor is it offered in the sense of a new approach to the problem. The interview, as outlined, is merely a summary of the type of examination used most frequently by various members of the board. Each examiner uses his particular variant, which he changes to suit individual situations.

Using some variation of the outlined interview as a basis for examination, the neuropsychiatrist employs his power of observation and his previous experience in evaluating the capabilities of the candidate. In doubtful cases a brief consultation with a fellow examiner usually results in a deci-

sion. When necessary, the services of the psychometrist are utilized. At times a consultation with the medical director is useful. In cases in which special technics are necessary for a decision, the candidate is either held for such tests at a later date or rejected with the recommendation that he appeal to a medical advisory board through his local board. In any case of doubt, the question is a matter not so much of diagnosis as of whether the candidate in question will make a good soldier and whether he is mentally durable.

The monotony of the routine, in addition to the continuous rapid interviews, tends to dull the examiner's clinical perception. This is significant because the entire value of the examination depends on the examiner's clinical judgment. Therefore, it is recommended that each neuropsychiatrist examine no more than 10 men per hour, nor more than 50 men per day. Three days out of each week is apparently the maximum effective time available for the average experienced neuropsychiatrist.

SUMMARY

A state of national emergency exists, which requires the entry of large numbers of young men into the Army of the United States. All such candidates are examined in order to eliminate those who are unfit for military service. One of the more important of these examinations is the neuropsychiatric evaluation. A review of the neuropsychiatric problems occasioned by World War I suggests the magnitude of the present problem. Modern warfare demands even greater intellectual and emotional stability in the armed forces. Hence the importance of the neuropsychiatric examinations has increased proportionately. Owing to the limited time available for such examinations, a compromise must be reached between perfection and failure to discover neuropsychiatric disabilities. Certain observations based on examination of 5550 candidates from the Boston Area have suggested means whereby such a compromise may be reached.

Under the present mobilization system there are three channels of admission to the Army. With the exception of the air force, volunteers for enlistment in the Regular Army are not examined by a neuropsychiatrist. A comparison of the number of neuropsychiatric disabilities discovered under the present enlistment system, with the number revealed by trained neuropsychiatrists, suggests that a more thorough examination of the recruits is advisable. Although national guardsmen are examined several times before induction into the Army, a neuropsychiatric evaluation is

not routinely employed. Examination of a group of guardsmen by a neuropsychiatrist revealed that it would be advisable to place more stress on this aspect of the examinations.

Candidates for admission to the Army under the Selective-Service Act are examined at least twice before induction. Examinations by the general practitioners, internists and surgeons serving on the local selective-service boards are sufficiently thorough to discover most of the rejectable disabilities. Examinations by the local boards of Massachusetts have resulted in a rejection of approximately 60 per cent of all candidates examined. It is estimated that about 15 per cent of the rejectees, or 9 per cent of all selectees, were not accepted because of neuropsychiatric disabilities. The medical specialists of the induction board have discovered disabilities in about 20 per cent of the candidates passed by the local boards. Rejection by the induction board for neuropsychiatric disabilities has been only 2 per cent of all selectees; nevertheless, one quarter of the rejections by the induction board has been for neuropsychiatric disabilities. This implies that neuropsychiatric evaluation of the candidates is least thorough by the local boards and most exacting by the specialists on the induction boards. It is therefore suggested that more emphasis might be placed on the neuropsychiatric evaluation of the candidates in their initial examinations and that a final evaluation by trained neuropsychiatrists is necessary to eliminate the less readily detectable but equally important abnormalities.

Certain suggestions are made concerning the technic of a compromise neuropsychiatric evaluation, based on observations made during the examination of 5550 candidates for the Army of the United States.

Only time will tell whether the results of the present mobilization system are worth the care and effort expended. No final conclusions may be drawn from the observations presented in this survey.

REFERENCES

- 1 Public Resolution No. 96, Seventy-Sixth Congress, August 27, 1940
- 2 Williams, F. E. Introduction. In *The Medical Department of the United States Army Neuropsychiatry* (Vol. 2). 534 pp. Washington Government Printing Office, 1929. Pp. 1-3
- 3 Bailey, P. Detection and elimination of individuals with nervous and mental diseases. *Ibid.*, pp. 57-86
- 4 Bailey, P. and H. Ber, R. Occurrence of neuropsychiatric diseases in the army. *Ibid.*, pp. 151-156
- 5 *Idem* Analysis of special neuropsychiatric reports. *Ibid.*, pp. 157-269
- 6 Love, A. G. and Davenport, C. B. *Defects Found in Drafted Men*. 1663 pp. Washington Government Printing Office, 1920
- 7 Sullivan, H. S. A talk delivered at a seminar for Selective Service psychiatrists, Boston, January 30, 1941 (unpublished)
- 8 Mobilization Regulations (19), August 31, 1940. Sect. XIX
- 9 Henderson, D. K. and Gillespie, R. D. *Text book of Psychiatry for Students and Practitioners*. Fifth edition. 667 pp. New York and London Oxford University Press, 1940
- 10 United States Army Regulations (600.500), November 20, 1939. Paragraph 2, C (1)

ADDENDA

SAMPLE NEUROPSYCHIATRIC INTERVIEW

The following description may give the impression of a lengthy procedure. In practice, the interview may be completed in three minutes with a normal subject. Additional examination and questioning are often necessary, and should not be neglected for the sake of speed in examination. The subject should be carefully observed in every movement and response from the moment he enters the examining room to the moment he leaves. Careful observation of the subject's behavior often yields more clues to abnormalities than the formal examination itself. The examiner should sit with a cloth over his lap about six feet from and facing the door. A desk or table is placed at his right, for instruments and papers. A straight chair is supplied for the subject about three feet in front of and slightly to the left of the examiner. The subject arrives nude or clad in shoes and bathrobe. The following routine ensues:

Come right in. Put your papers on the table. Shake hands with the subject. Take off your robe and shoes. Put them on the chair in the corner. Observe physique, co-ordination, mannerisms and behavior.

Stand here, toes on the line, toes and heels together. Close your eyes. Stand steady. Push the subject. Open your eyes. Stand on one foot, on the other. Observe equilibrium, Romberg and response to push. The latter is especially significant in neuroses and malingering. Elicit abdominal reflexes.

Sit down. Put your feet on my lap, legs extended. Hold your legs still. Perform Babinski maneuver. Put your feet down, toes and heels together. Put your hands in your lap. Elicit ankle, knee, wrist biceps and triceps reflexes. During elicitation of reflexes ask: Have you any trouble with your hands, feet, legs or arms? Have you any numbness or tingling sensations anywhere? Are you troubled with headaches? Backache. D 21

spells? Stomach trouble? How is your appetite? Do you sleep well? Have you ever been unconscious or fainted? Have you ever been knocked out or had your head hurt? If so, ask concerning frequency, sequelae last time it occurred and so forth. Has anyone in your family ever had fits, spells, spasms, convulsions or epilepsy? Have you? Has anyone in your family ever had mental trouble or been in a state hospital because of trouble with his mind? Have you? Have you ever had any nervous or mental breakdowns? Do you get excited easily? Have blue spells? Hold your temper well. How do you get along with the girls? Do you drink? How often do you get drunk? Do you ever have to be taken home? Were you ever arrested for being drunk? Why are you joining the Army? When said in a friendly, curious fashion the answer to the last question is extremely helpful in evaluating the personality.

Examine the pupils for size, shape, equality and reaction to light and accommodation. Say: Show me your teeth. Open your mouth wide. Put your tongue out. Back in. Observe facial muscles for action, tremor and so forth.

Have the subject perform finger-nose test with both hands, eyes open and eyes closed and then say: Grip my hands hard and when I say three, let go suddenly. Grip! one, two, four, six, three! Observe co-ordination, strength and tonus. Put on your shoes and robe. While he is doing so, ask the subject: How far did you go in school? If a graduate of high school or college, ask present occupation. If not: Why did you stop at (the grade)? Did you repeat any grades? Why? At this point if indicated by school record or behavior of the subject, ask suitable questions from the Kent Ten Minute Oral Intelligence Test or similar tests. If the examiner suspects that the candidate's mental age is below requirements he is referred for psychometry. (Candidates with a mental age of less than ten years were considered unfit for the complicated duties of modern warfare.)

PSYCHOMETRICS AT AN ARMY INDUCTION CENTER

CHARLES R. ATWELL, M.A.,* WILFRED BLOOMBERG, M.D.,† AND FREDERIC L. WELLS, Ph.D.‡

BOSTON

IN NOVEMBER, 1940, induction of selective-service men into the Army of the United States began in Massachusetts. The final physical examination of the selectees was carried out at one of three induction boards. The men who came to the Boston Induction Board had been accepted by the various local boards and had ordinarily left their work, taken leave of their families and expected to go directly on to camp on the same day. The medical board making the final physical examination consisted of a group of specialists, all co-ordinated by and under the direction of a medical officer of the Regular Army.§ Among this group of specialists were neuropsychiatrists, whose function it was to give an evaluation of the nervous and mental status of each selectee before this induction.

It became quickly apparent to the physicians conducting this portion of the examination that an essential part of the procedure, in many of the cases, must be concerned with evaluation of "intelligence." The clinical estimate of a psychiatrist of long experience was, of course, of the greatest importance. However, the average time available for each selectee for complete neurologic and psychiatric examination was only six minutes. The large number of men examined in quick succession made it desirable that some more or less objective measure of intelligence level be available in the more doubtful cases. At first, partly by the chance that a copy was in the possession of one of the examiners, the Kent Emergency Ten-Minute Oral Test was used. This was extremely helpful, but it soon became apparent that the answers to the comparatively small group of questions were being passed around from one selectee to another in the dressing rooms; and in addition, even the short time required for this scale interfered with the ability of the neuropsychiatrist to examine the number of men required in the given time, to keep up with the other specialists and to enable the board as a whole to function efficiently.

Decision on each man had to be made immediately, since the selectee was either accepted, sworn in and sent to camp that same day, or re-

jected and sent back to his home. The requirements seemed to be for an objective procedure, well standardized, sufficiently varied to allow for great inequalities of education, sufficiently multiple to avoid the danger of dressing-room discussion, and capable of being administered in a comparatively short time. The basic question is not one of "mental age," still less of "intelligence quotient," but, Is this person's capacity in these respects sufficient for the demands that will be made on him by the Army?

Consequently, one of us (W. B.) sought the assistance of a group of psychologists, consisting of Messrs C. R. Atwell, F. L. Wells, H. Barry, E. A. Lincoln, R. C. Moore, H. C. Patey, L. S. Trowbridge and N. Y. Wessel. This group volunteered to organize a procedure¶ that would answer the above requirements. Not all the selectees appearing before the induction board were examined by the psychologist. Only those were referred who, in the opinion of one of the examining neuropsychiatrists, were below the critical level of capacity for Army demands. The psychologist administered the tests and noted his results, and the selectee was then sent back to the referring physician, who made the final recommendation of acceptance or rejection, on the basis of the test and clinical judgment. Final action on the recommendation lay, of course, in the hands of the Army officer who was medical director of the board.

The chief problem for the group in considering the technics to be used was the limited amount of time available for individual examinations. The question of group tests was naturally considered, but these were looked on as impracticable for both administrative and technical reasons. It was originally believed that the verbal items of the Wechsler-Bellevue Intelligence Scale, supplemented by a vocabulary test, and alternate arithmetic questions from the Alpha Test, would be satisfactory for those cases in which verbal tests could be justified. The selection of nonverbal tests caused more difficulty, but it was expected that the Beta Block Counting Test, the eleven, twelve and fourteen year levels of the Porteus Mazes, and the third, fourth and sixth designs of the Wechsler-Bellevue Block Design Test would be relatively useful.

The original objective was the determination of

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§A more complete exposition of the general scheme is contained in a paper by von Storch, Pratt, Farrell, Currier and Viets in this issue of the *Journal*.

¶Acknowledgment is hereby made to the medical officers of the First Corps Area and of the Boston Area Induction Board for their co-operation in permitting the setting up of this experimental procedure.

"mental age"* about a critical level of twelve years, the cases seen were referred by the psychiatrists as questionable from this standpoint

Experience brought about a number of modifications in this outlook. It was naturally easiest to deal through brief examination with the relatively few candidates who were of low (under ten years) mental age or high (over fourteen years). Those who constituted by far the greatest number of referrals (mental age scores between eleven and thirteen) formed the major problem. Short cuts, such as printed self-administering material, were generally unsatisfactory, since the subject's performance was unduly handicapped by printed instructions. A probable explanation of this is infrequency of reading among the population examined, with the consequent lack of facility with a comparatively little used skill. The lack of nonverbal material that would be adequate and not time consuming was keenly felt, not only with selectees with foreign backgrounds but also with many who lacked skill with their own language. One example of this difficulty was an American born man who went through the sixth grade of grammar school, but scored only at the ten year level on verbal tests, although he rated fourteen or above on all the nonverbal tests.

No rigid routine of tests should be given, it is

*The use of this symbol was based on practical factors. Its limitations are fairly understood by those technically concerned.

important to have clinicians who are qualified to use their own judgment concerning the techniques that will enable them to give a reasonably accurate approximation of intellectual levels. The tests should be varied to eliminate effects of coaching, which have been observed occasionally. A few questions tapping different mental functions are much more useful than many questions referring to only one type of ability.

Figures are available for four members of the group of psychologists, in a total of sixteen days' examination. During this period, 5010 men were passed through the induction station. Of these, 199 were referred by the neuropsychiatrists for psychometric examination. Of those referred, 79 received a mental age rating of less than twelve, 120 a rating of twelve or over. The number of psychometric examinations in any one day ranged from 4 to 41.

The critical level of twelve was set up as an initial working basis. The Army regulations originally set a mental age of eight as the critical one, and this is obviously low for a modern mechanized army, which places a premium on individual initiative and independent action, in comparatively small groups. The level of twelve may be too high for general use. There is apparently a need for clarification of the situation in the immediate future.

BOSTON MEDICAL LIBRARY

REPORT OF THE PRESIDENT FOR THE YEARS 1933 TO 1940†

I WAS elected President of the Boston Medical Library on January 17, 1933. I consider it incumbent on me to review briefly the salient events of the last eight years. In 1933, the library was suffering acutely from the severe financial depression prevalent at that time. Income from invested funds had dropped from over \$27,000 in 1930 to \$16,000 in 1933—since then, it has dropped to below \$14,000. Income from dues decreased by more than \$1000. The most stringent economies had to be instituted to meet the situation. The staff was reduced, and a 10 per cent salary cut was cheerfully accepted by those remaining. Salaries have since been restored. Evening sessions were omitted for a time, but have since been resumed. The maintenance of the building was by force of circumstances allowed to fall to a meager and inadequate level. Moreover, we were faced in

1933 with a staggering deficit of over \$30,000, which had gradually accumulated over many years, \$18,000 of this deficit being owed to the incomes of various restricted book funds as a result of having spent the money for other purposes, largely for the purchase of periodicals that were considered essential to the library. Furthermore, a cash debt of \$12,000 was owed for binding and periodical subscriptions. This unhappy situation weighed heavily on the minds of the officers of the library.

The most pressing cash debts incurred for binding and periodicals were paid off in cash taken from capital, in addition to a gift of \$2000 from a generous friend of the library, given for the purpose.

The debt to unexpended restricted income of book funds remained an incubus from which there seemed no escape. In spite of a determination at least not to let this sum increase in the future, it

†Read at the annual meeting of the Boston Medical Library, January 28, 1941.

had increased from \$18,000 to over \$23,000 at the end of 1935. Something radical had to be done. This debt of \$23,000 was attacked from several angles and has been gradually whittled down, so that it stands today at the moderate figure of about \$5450.

This has been accomplished in several ways. In the first place, since 1935, current expenditures have been kept rigidly within the incomes of the various restricted funds. We have been aided greatly in accomplishing this by the generous help of many medical societies of Greater Boston in underwriting subscriptions to foreign periodicals. Secondly, competent legal opinion was obtained to the effect that bound periodicals might properly be considered books. The adoption of this definition by the Board of Trustees permitted the cancellation of a considerable amount of the debt to the restricted book funds that had been incurred in previous years for periodicals. Thirdly, administration expenses for handling investments and funds that had been solely borne by the unrestricted funds were charged pro rata to the restricted funds as well, and these charges were carried back for a number of years. Finally, cash received from unrestricted gifts was allocated and spent directly toward the extinguishment of this debt.

In the latter part of 1935, the library received an unrestricted bequest of \$25,000 from the estate of Mrs. Amelia Jackson Sargent, a sister of Oliver Wendell Holmes. This was indeed a lifesaving gift. It permitted paying off in toto the remaining binding bills of previous years, as well as a note of \$3000 to the State Street Trust Co. The remainder was expended for renovation of the main building and the erection of two tiers of steel stacks in the annex. These improvements were urgently needed and put the building in excellent working condition for the first time in many years.

In addition to this generous bequest, the library has received during the last eight years the following gifts and bequests in round numbers: in 1934, a gift from Dr. John W. Farlow of \$2000, unrestricted; in 1936, a gift of \$10,000 from the Wadsworth family (this was given to establish and maintain suitable offices for officers of the Library on the first floor, as a memorial to Dr. Oliver F. Wadsworth, and his son, Dr. Richard G. Wadsworth); in the same year, a bequest from the estate of Dr. Malcolm Storer of \$2000, unrestricted; in 1936, a bequest from the estate of Dr. John W. Farlow of \$10,000, unrestricted; in 1939, a gift of \$1000 from the friends of Dr. George H. Bigelow

as a memorial fund for the purchase of books on public health. In addition to these larger benefactions, a constant stream of gifts and bequests of books, manuscripts, portraits and medical memorabilia of all kinds from numerous friends has added much to the value of our collections.

In 1937, the by-laws of the corporation were amended: a board of trustees was created and the terms of office for all officers, except the librarian, were limited.

During the last three years, through the efforts of the director, Mr. James F. Ballard, the aid of several WPA projects has been secured for the library. By this means a vast amount of important work has been accomplished at minimal expense—work that otherwise could not have been done. The mass of periodicals and serials accumulated during twenty years, piled high in the basement, was examined and sorted. Items wanted by the library were catalogued and filed, the remainder disposed of by exchange or sale. Over 397,000 items were examined, 25,000 added to the files, over forty tons of material disposed of by exchange, and an even greater tonnage sold for waste paper. Forty-one thousand books were examined and disposed of, and 19,000 periodical and serial titles were checked for the new edition of the *Union List of Periodicals and Serials*. Three hundred and seventeen thousand dissertations and theses, as well as several thousand bound volumes, have been examined, catalogued and shelved.

The catalogue in Holmes Hall, which was in a sad state of dilapidation, was renovated, cleaned and partly retyped. Nearly sixty-three thousand volumes were vacuum cleaned and dusted. This work is still going on. In spite of the imposing amount of work done, much still remains, and I cannot say truthfully that our basement has as yet been transformed into a model of orderliness.

During the last two years, with the co-operation of the *New England Journal of Medicine*, over 90 per cent of the books received for review have, through the kindness of the reviewers, been turned back to the library. This has been a very great help, since it puts on the shelves a considerable number of the newest books that otherwise would have had to be purchased.

During the last year, the Committee on Post-graduate Instruction of the Massachusetts Medical Society has provided funds for the equipping of a bibliographical traveling library in connection with the courses offered. This joint enterprise, whereby the facilities of the library are extended to

outlying districts, is in line with a policy that the library has long desired to adopt but has been unable to undertake hitherto for lack of funds. It is an interesting experiment of much promise.

Cordial relations have been maintained between the Boston Medical Library and the libraries of the three large medical schools of Boston, and also with the libraries of the large hospitals. Coordination of policy with the library of the Harvard Medical School has obviated competition and the duplication of expensive items.

While the library has been struggling during the last eight years properly to maintain its services and its building, a steady and noteworthy accretion to its collections of incunabula and historical items has been going on, as the result of judicious expenditures from our funds restricted to these purposes, so that today the library in this respect has attained an outstanding position in the country.

The use of the library has shown a steady growth during the years, and the needs of students, scholars and the profession, in general, have been met quite satisfactorily, I believe, through the sustained efforts of the small but devoted staff.

Although, on the whole, considerable progress has been made during the last eight years in vari-

ous directions, many serious problems remain. We are still terribly overcrowded and understaffed, and there is a crying need for the completion of the steel stacks. The financial support of the library is inadequate, depending as it does largely on its relatively small membership, which has remained practically stationary for years, in spite of vigorous efforts to the contrary.

The relation of this library to the libraries of the medical schools and hospitals of this community, and to the profession in general, is a difficult problem that awaits satisfactory solution. These smaller libraries provide for the ordinary needs of their clientele, so that many doctors do not feel the need of becoming members of the Boston Medical Library. What the ideal setup should be for this community needs serious study and wise decision. Preliminary steps in this study are already under way.

We are indeed fortunate in possessing a splendid library, inherited from our predecessors and built up by the unremitting effort and generosity of many wise and devoted friends of medical literature; such a precious heritage must not be allowed to decline, but must be fostered, cherished and sustained by the medical profession.

LINCOLN DAVIS, *President*

REPORT OF THE LIBRARIAN FOR THE YEAR 1940*

IN 1876, John Shaw Billings, then librarian of the Army Medical Library, wrote, in commemorating a century of American medicine: "The medical library of most promise in Boston is that of the Medical Library Association, which, though only a year old, has about 3000 volumes, and will probably rapidly increase." He was right about the "library of most promise," for recognition was soon evident, and the medical collection of 11,000 volumes in the Boston Public Library was transferred to us. Other medical books followed, and the Boston Medical Library carried out the second injunction, mentioned by Billings, and did "rapidly increase." In 1940 we find ourselves with over 300,000 books and pamphlets; we are increasing yearly at a rate of 9000 to 12,000 items. In another twenty years we shall reach the half million mark, a sizable library by any standard, and a collection needing all our stack space now available or projected. We are now, sixty-four years after Billings's remarks, still having "growing pains," apparently a perpetual and normal state for an active

library. Our next major endeavor should be to complete the stacks in the annex provided for that purpose.

During the year, 1940, not only has the library grown in volume with the addition of about 3500 books and 9000 pamphlets, but the high quality of our accessions, a standard set by my distinguished predecessors, has been maintained. When I look over our list of rare books and manuscripts acquired during the year, I cannot help believing that we are fortunate beyond the dreams of many of our friends, both past and present.

When Bodley set up his staff at the library door at Oxford in 1597 he began the restoration of an ancient foundation, soon making the library into one of the most famous in the world. He left his own account of the matter:

I found myself furnished with such four kinds of aids as, unless I had them all, I had no hope of success. For without some kind of knowledge, without some persueability to go through with the charge, without good store of friends to further the design, and without special good leisure to follow such a work it could not but have proved a vain attempt.

*Read at the annual meeting of the Boston Medical Library, January 28, 1941.

Those same cherished "four kinds of aids" have made the Boston Medical Library what it is today, and without them your librarian could never have reported such important additions to our collection as I shall briefly mention.

Of manuscripts, we continue to add those of particular New England interest—health reports, letters, account books, bills for drugs and for services and all matters pertaining to the practice of medicine by our forefathers. The Boston Medical Library is the natural home for such items, and many have been received by gift. The librarian, however, has not hesitated to buy valuable material of this type, knowing well how time devastates the fugitive sheet that the future historian may consider of prime importance. Rich, too, have been our acquisitions of English imprints, fourteen printed before 1640 and four more before 1700. To our fifteenth-century books, now one of the greatest collections in the country, we can also report fourteen additions, all placed on our shelves since the publication last year of the *Second Census of Incunabula* by Miss Stillwell.* They are now entrusted to our care, precious relics of early printing and medical history. For them and their like, a treasure room is urgently needed, a place where the indispensable tools of scholarship, many of them unique, can be properly housed. To them must be added the early American imprints, reflecting the beginnings of medicine in our country. Not a few of these also found their way to our shelves in 1940. A number of important collections of books, moreover, have been acquired, particularly the Baumes Collection of French medical tracts, the Carsten Collection (850 volumes), illustrative of the physician in literature and of literary doctors, and the twenty-odd complete editions of the writings of Domenico Cotugno.

These acquisitions all resulted from the "four kinds of aids," just as valuable in our times as in Bodley's. The "some kind of knowledge," resides largely in the mind of the director, Mr. James F.

Ballard, whose quick recognition of the value of a book or a collection, based on long experience and a natural flair for book acquisition, again leaves the library in his debt. Without him, the library would indeed be a poorer place. Our "purse-ability," not large and yet greater than all but a few medical libraries in this country, gives us strength and a certain latitude of action. In book buying, to be able to acquire promptly often means securing the best. Since we are ever watchful of the market, the library rarely misses what our small funds can pay for. War years offer many unusual opportunities, however, and we do not anticipate any difficulty in 1941 in using all our book fund for worth-while purchases. Bodley's third aid, a "good store of friends to further the design," has never been wanting. What better friend has the Boston Medical Library ever had than our retiring president? May his interest continue from afar, but not too distantly afar, and for many years. And finally, Bodley's "special good leisure to follow such a work." There, indeed, we are weakest. Few have leisure today. Work of this type, for most of us means "nights, holidays and Sundays." But what better use of time? A report, a committee meeting or even the lowly book review serves to add to our rewards, those intangible assets so difficult to assess, but so potent in the advance of civilization. The most civilized country is the one that has produced the most great men. Has any man ever been great without a love of books? What country has achieved distinction, moreover, without libraries? Is not Boston a better Boston because our forebears collected the medical literature of their day, added to it the writings of the past and saw to it that a medical library should endure and grow? Well did our fathers of the Medical Library Association of 1875 realize the value of Bodley's four aids, and by the use of knowledge, purse-ability, friends and leisure set up a broad foundation on which we are still building. The librarian today sees no reason to change the four aids; on them rests the future of our institution.

HENRY R. VIETS, *Librarian.*

**Incunabula in American Libraries: A second census of fifteenth-century books owned in the United States, Mexico and Canada.* Edited by Margaret Bingham Stillwell. New York: The Bibliographical Society of America, 1940.

MEDICAL PROGRESS

PRACTICAL ASPECTS OF SURGICAL SHOCK*

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BOSTON

TODAY, with half the world at war, the subject of shock is of particular interest. However, even in times of peace, it is of primary concern to both physician and surgeon because not only is it a frequent determining factor in the outcome of many surgical and medical conditions, but, being a reversible phenomenon, it offers hope of cure if recognized early and treated properly. This review is intended to focus attention on those aspects of the subject that are of importance in everyday surgical practice.

Shock has been described as a clinical condition, the characteristics of which are pallor, a cold, moist skin, a rapid thready pulse, shallow respirations, an appearance of anxiety that soon becomes one of apathy, a subnormal temperature and a low blood pressure. It is this clinical state or syndrome that quite properly comes to mind when the term "shock" is used. The time has come, however, when shock must be suspected, diagnosed, if possible, and treated before the development of this syndrome. The familiar picture of shock must be regarded as evidence of uncompensated or late shock. This is by no means a new conception. It was emphasized by Cannon¹ nearly two decades ago. Keith,² discussing wound shock in World War I, speaks of "compensated" and "uncompensated shock." The unreliability of the pulse rate and blood pressure as indications of shock, both experimental and clinical, has been stressed many times.^{3,4,5} Nevertheless, although not new, the conception of compensated shock requires a wider clinical application. It is fair to state that shock frequently plays an important and often unrecognized role in the morbidity and mortality rates of appendicitis, intestinal obstruction, perforated ulcer, peritonitis from any cause, burns, severe fractures and acute or subacute loss of blood.

It is generally accepted today that an essential feature of shock, regardless of cause, is a disparity between the amount of circulating blood and the size of the vascular system. This can be brought about either by a loss of fluid from the circulation or by an uncompensated increase in the size of the vascular bed. The size of the vascular sys-

tem may be increased by such sudden loss of vasomotor tone as occurs in fainting and under spinal anesthesia, or it may be increased by widespread capillary dilatation and injury from bacterial toxins, certain anesthetics or histamine. Shock due to dilatation of vessels is referred to as "neurogenic shock."⁶ When there is actual injury to capillaries and vessels the term "vasogenic shock" may be used. By and large both neurogenic and vasogenic shock are characterized by a low blood pressure, are more easily recognized and are less serious than shock secondary to an actual loss of fluid from the vascular system (so-called "hematogenic shock").⁶ This loss may occur in many ways: as blood in hemorrhage; as plasma in burns, peritonitis, crushing injuries and intestinal obstruction; and as water in diarrhea, vomiting or sweating. Fluid may be lost from the blood stream into tissues as a consequence of generalized capillary injury. This may be a primary phenomenon, as described above, producing vasogenic shock, or it may be secondary to a prolonged reduction of the blood volume, reduced blood flow and anoxia.

Usually there are many factors in shock, some a primary cause of the reduced blood volume, others secondary to it. Prolonged peripheral vascular collapse due to nervous stimuli (neurogenic shock) may result in actual injury to capillaries (vasogenic shock). When there is widespread capillary injury not only is the vascular bed increased in size but fluid is lost from the circulation into the viscera, thus bringing about an actual reduction of the blood volume (hematogenic shock). Conversely, if the blood volume is reduced by loss of fluid from the circulation, as in hemorrhage, this leads to reduced volume flow, a reduced delivery of oxygen, tissue anoxia and widespread capillary injury. Thus, hematogenic shock leads to vasogenic shock. The situation has been well depicted by Moon⁷ as a vicious circle. His ideas and those of Blalock are reproduced in a modified form in Figure 1, in which a reduction of the effective blood volume is shown as the essential factor and pathologic changes in the viscera as a final result of shock.

The pathologic changes that occur in the viscera are not of a specific character, but represent the end result of capillary injury and tissue anoxia.⁸

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There are dilated, congested capillaries, capillary hemorrhages, edema and in some cases degenerative changes in parenchymatous tissues throughout the lungs, liver, kidneys and gastrointestinal tract. It is likely that, once well established, these pathologic changes are irreversible. Treatment, if it is to be effective, must be instituted before generalized tissue damage occurs.

At this point the blood-pressure changes in shock require further comment. If the shock is primarily due to factors that produce vascular re-

in a few minutes both return to comparatively normal levels and may remain there for long periods.⁸ However, from the moment of injury there is a rapid and progressive reduction of the blood volume. Indeed, in severe shock in which death occurs within eight to twelve hours, the principal reduction of the blood volume occurs within two or three hours of the injury. This is shown in Figure 2. It should be noted that after three hours the blood volume falls to two thirds of its original total. There is a marked rise in the hematocrit

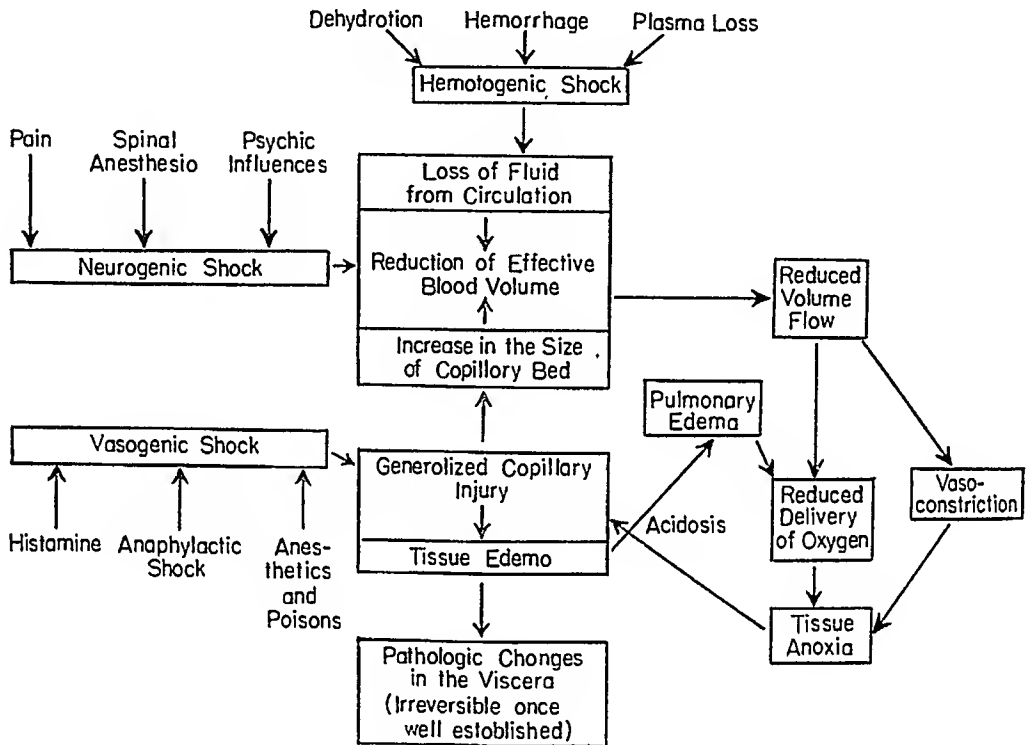


FIGURE 1. *The Vicious Circle of Shock.*

The classification of shock as given by Blalock is combined with the ideas of Moon to provide a more complete picture of the many variables that enter the shock syndrome.

laxation or generalized capillary injury, there will be a low blood pressure. This occurs in such conditions as spinal anesthesia, histamine shock and barbiturate poisoning. If the shock is a consequence of loss of fluid from the blood stream, as in hemorrhage, burns, peritonitis, intestinal obstruction or mechanical injury, there may be a low blood pressure at the onset as a consequence of pain and psychic influences. If the shock is very severe, there may be no reaction from this fall in pressure, but usually after pain and fear have been relieved the compensatory mechanisms of the circulation are such that the usual clinical manifestations of shock do not appear. For example, if an anesthetized animal is subjected to mechanical or thermal trauma there is an initial fall of blood pressure and elevation of the pulse rate, but with-

reading, indicating hemoconcentration, but very little alteration in the pulse rate and blood pressure. If one were to examine the animal at this point, noting only the levels of the pulse, respiration and blood pressure, a diagnosis of shock would be untenable. Yet, this animal is in a state of grave shock, as evidenced by the reduction of the blood volume. Under the conditions of experiments of this type a fall in the blood pressure indicates a failure of the compensatory mechanisms of the body and impending death. It was shown years ago that a similar response may occur in experimental hemorrhage.⁹

In man it has been shown that as much as 500 to 1000 cc. of blood may be removed from a volunteer subject without significant alteration of the pulse or blood pressure, or the appearance of pal-

lor, thirst or a sensation of anxiety.¹⁰ In fact, there may be so little change in the physical appearance of the subject at rest that a physician unaware of the removal of the blood would pronounce him fit to give transfusion. Yet, the rapid removal of an additional 500 cc. of blood might prove fatal. So it is with many clinical conditions. A familiar example is the free perforation of duodenal ulcer. The patient who is seen within half an hour after the onset is often described as being in severe shock. He is prostrated with pain. There are marked pallor, a rapid pulse, a moist, cold skin, a subnormal temperature and a low blood pressure. After the pain is re-

clinical picture, it places a serious and unnecessary burden on the circulatory system that, added to other factors, may prove the deciding point in a fatal issue. It behooves the surgeon, therefore, to anticipate and correct such reductions of the blood volume before the signs of uncompensated shock appear.

The value of early treatment in shock is well known. The importance of instituting therapy in so-called "compensated shock" before the usual clinical manifestations of shock appear has not received adequate attention. Yet it is in this period that treatment is most likely to be effective. In an experimental study of shock due to severe

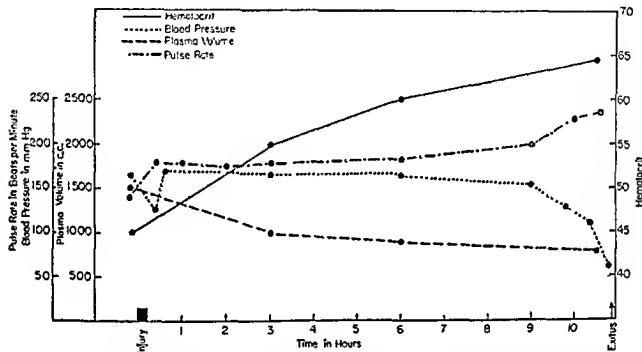


FIGURE 2. *The Course of the Changes in the Hematocrit, Blood Pressure, Plasma Volume and Pulse Rate in Experimental Shock Due to Severe Burns.*

A fall in the blood pressure is a late sign, indicating collapse of the compensatory mechanisms of the body.

lieved and compensation is established, the color of the skin returns, the pulse improves and the blood pressure returns to normal levels. At this point one is apt to say that the patient has reacted from his shock, or if he first enters the hospital in this state, it may be said that he is not in shock. Yet this patient may be in severe shock. He may be in the same condition as the experimental animal referred to above, or the subject who has just given a 1000-cc. transfusion. He is in a state of compensated shock. The reduction of the blood volume is such that although the usual clinical signs of shock are not manifested, there is a heavy burden on the circulation that, when combined with the effects of anesthesia and a surgical operation, may prove fatal. So it is with many clinical conditions, such as appendicitis, peritonitis and intestinal obstruction. The factor of shock is present, and even though it is not severe enough to produce the classic

burns it was shown that if treatment was delayed until the blood pressure had fallen, it was of no avail; and even if such treatment restored the blood volume to normal, there was no striking prolongation of the life of the animals and no alteration of the usual pathologic changes in the viscera.¹¹

How, then, may shock be recognized before the usual clinical signs appear? The significance of hemoconcentration as an early sign of shock has been emphasized by Moon.⁷ As shown in Figure 2, the rise in the hematocrit in severe thermal trauma closely approximates the fall in the plasma volume. This sign is unquestionably of value and may appear long before there are significant alterations of the pulse or blood pressure. On the other hand, it is by no means pathognomonic, and since control observations taken before an injury are not possible in the clinical treatment of shock, the initial level of the hematocrit is often

of little value. A low hematocrit due to anemia may rise to a normal level as a consequence of hemoconcentration. Moreover, concealed hemorrhage is so often a complicating factor in shock that the hematocrit levels are very difficult to interpret. Finally, as Weiss¹² has emphasized, in the well-hydrated patient, plasma may be lost into an area of injury but hemoconcentration may be prevented by fluids entering the circulation from the tissue spaces elsewhere in the body. Thus, hemoconcentration may not be manifest even in traumatic shock uncomplicated by hemorrhage. However, it is true that a changing and particularly a rising hematocrit is of great significance in the early stages of shock.

Scudder and his associates^{13, 14} point out that four determinations are essential in evaluating the early stages of shock — the hematocrit, the specific gravities of whole blood and plasma, and the level of the serum protein. By means of these data he believes that the onset of shock can be anticipated. The essential feature of these tests is the use of the falling-drop method to determine the specific gravity of plasma, from which the level of the plasma protein can be calculated. This provides a rapid and accurate check on the level of the serum protein. The protein level is a valuable check on the hematocrit and provides information of considerable importance. It furnishes evidence of protein loss as well as hemoconcentration and may give an index of hemoconcentration in the presence of anemia. However, not infrequently in the early stage of shock combined with hemorrhage, these figures may be within normal limits. For this reason, although such determinations are of inestimable value in the appraisal of early shock, it is a mistake to consider them as an accurate and infallible guide to the state of the circulation. The details of the history, the character of the illness, the quality as well as the rate of the pulse, the general state of hydration and the color of the skin and mucous membranes provide information of great value to the careful observer. Emphasis must be placed on an evaluation of the total picture rather than on the results of any laboratory data if one is to recognize the earliest manifestations of shock.

It is not sufficient to urge early therapy in shock. The quality and quantity of the therapy are of extraordinary importance. Treatment is largely confined to efforts to remove causative factors and to restore the blood volume to normal. Although there is experimental evidence to support the use of adrenocortical extract, various drugs and high concentrations of oxygen, these methods must be looked on as only of contributory value. The chief requisite is to restore, if possible, the lost

fluid. Treatment therefore depends on the type of fluid required. Although there is considerable overlapping, three broad groups may be recognized: dehydration shock, in which the principal requirement is water and salt; shock produced by hemorrhage, in which blood is needed; and finally, shock due to loss of plasma, for which plasma is the best replacement. In recognizing the type of fluid replacement required, determination of the hematocrit and serum protein is of great value.

Dehydration shock is characterized by severe depletion of water and electrolytes. It is encountered in its most classic form in Asiatic cholera,¹⁵ but in lesser degrees is common in clinical practice,¹⁶ particularly in high intestinal obstruction, in some cases of peritonitis and in prostrating diarrhea or fever. The changes in the blood consist in an elevation of both the hematocrit and the serum protein and usually a fall in the serum electrolytes. The type of fluid required is physiologic saline or lactate solution, depending on the relative losses of chloride and sodium ions. Treatment of this form of shock is essentially that of dehydration, and the details of treatment have been well worked out by many investigators.¹⁶⁻¹⁹ Emphasis should be placed on the dangers of giving an excess of saline solution in the treatment of dehydration shock.¹⁸

Shock due to hemorrhage is well understood. In its acute form it is characterized by a fall in the hematocrit and little or no change in the level of the serum protein. The treatment, of course, is to restore the lost blood by transfusion, but the frequency with which this may be necessary is not fully appreciated. The fact that there has been no gross hemorrhage during a prolonged surgical operation is no indication that there has not been a considerable loss of blood. The amounts of blood taken up in towels, swabs and sponges may be enormous, and it should be axiomatic that at least one transfusion is advisable following extensive surgery, even though there has been no gross hemorrhage. Although, as previously pointed out, patients may compensate well for considerable losses of blood, the sick surgical patient should not be required to face this additional and unnecessary hazard when the lost fluid can readily be replaced by transfusion. As Blalock⁶ has said, "There is probably no one procedure which, in recent years, has had a greater influence in reducing the mortality connected with accidents and operations than the more frequent use of blood transfusions."

The third and most important form of shock is that in which loss of plasma is the principal factor in the early reduction of the blood volume. This occurs in burns, in severe crushing injuries and,

to a lesser extent, in peritonitis and intestinal obstruction.²⁰ It is characterized by an elevation of the hematocrit but with only slight or no increase in the level of the serum protein. A normal concentration of protein in the presence of hemoconcentration is indicative of loss of protein and is a clear indication for injection of serum or plasma. The common practice of using physiologic saline solutions in shock accompanied by loss of plasma must be deprecated. Unless there are specific indications for its administration, as described under dehydration shock, more harm than good may result. The possible dangers following the use of saline solution in shock were pointed out long ago by Beard and Blalock.²¹ They showed that animals that had been given saline solution in shock often appeared worse after the infusions were stopped than if no treatment had been given.

There are three reasons why such a solution is harmful. First, although the injection produces a temporary rise in the blood volume with apparent improvement in the patient, not only is this of short duration but it is accompanied by such marked dilution of the blood that the serum protein is reduced to an edema level. Secondly, saline solution leaks out of the blood stream, not as such but as dilute plasma, thereby actually increasing the rate of protein loss. Finally, as a consequence of the loss of protein, the osmotic pressure of the blood is lowered and fluid leaks out of the blood stream, not only into the areas of injury but throughout the viscera, thereby accentuating the pathologic changes in the viscera.²¹ Thus, the use of saline solution in shock of this type not only produces no permanent rise in the blood volume but eventually leads to pulmonary edema and congestion, with a concomitant decrease in the aeration of the blood, thereby adding an additional factor to the vicious circle of shock, as depicted in Figure 1.

The efficacy of serum or plasma injections in shock has been demonstrated by many investigators.²²⁻²⁵ Emphasis has been placed on the fact that the level of serum protein is sustained, the osmotic pressure of the blood is not lowered, less fluid leaks out of the vascular system, and thus the beneficial effects are more permanent. It should be pointed out that in severe shock the beneficial effect of a single injection of serum or plasma may be no more permanent than that of saline solution.²¹ Plasma is lost into the site of injury, particularly in severe burns, so rapidly that within a few hours the blood volume again falls to a shock level. In severe shock, therefore, enormous amounts of serum or plasma may be necessary. In experimental shock due to thermal

trauma, it has been demonstrated that a continuous infusion of plasma at the rate of about 100 cc. per hour is necessary to maintain the blood volume at a normal level during the first ten hours.²¹ Elman²⁶ recommends giving plasma in amounts up to 1500 cc. during the early stages of severe burns, and Mahoney²⁷ has had occasion to give as much as 3000 cc. to a patient undergoing a one-stage resection for cancer of the head of the pancreas. How long plasma continues to be lost from the circulation in severe shock is probably variable. Elkinton and his associates²⁸ suggest that it continues for as long as forty hours. In any individual case, emphasis should be placed on frequent determinations of the hematocrit and serum protein, and continuation of therapy so long as there are indications.

Finally, it should be stressed, that one frequently encounters dehydration and blood and plasma loss in the same patient. Under such circumstances careful evaluation of the clinical and laboratory evidence is necessary if the total picture is to be correctly appraised and proper treatment instituted.

SUMMARY

Because of the compensatory reactions of the body the usual clinical signs are often absent in the early stages of shock due to dehydration, hemorrhage or loss of plasma. Successful treatment depends on the recognition of shock before the usual clinical signs appear. Varying degrees of shock of this type are frequently encountered in many common surgical conditions, notably peritonitis, intestinal obstruction, burns, trauma and hemorrhage. A correct appraisal of the condition and the institution of proper replacement therapy are dependent on a careful study of the patient as a whole, as well as an evaluation of certain essential laboratory data.

REFERENCES

- 1 Cannon W B. *Traumatic Shock* 201 pp New York D Appleton and Co., 1933
- 2 Keith, N J. Blood volume in wound shock. *Report of Shock Committee, English Medical Research Committee*. No. 26 47 pp London His Majesty's Stationery Office, 1919
- 3 Cope, Z A. A criticism of current views of shock and collapse. *Proc. Roy. Soc. Med.* 21:599 610, 1928
- 4 Roome N W, Keith, W S and Phemister, D B. Experimental shock: the effect of bleeding after reduction of the blood pressure by various methods. *Surg., Gynec. & Obst.* 56:161 168 1933
- 5 Aub, J C and Cunningham, T. D. Studies in experimental traumatic shock. II. The oxygen content of the blood. *Am J Physiol* 54:408 415 1920
- 6 Blalock, A. *Principles of Surgical Care, Shock and Other Problems* 325 pp St. Louis C V. Mosby Co., 1940
- 7 Moon, V. *Shock and Related Capillary Phenomena* 442 pp New York Oxford University Press, 1938
- 8 Dunphy J E, Gibson, J G, 2nd and Keeley, J L. Observations on the pathology of shock. *Surg. Gynec. & Obst.* 72:823 833, 1941
- 9 Meek, W. J and Eyster, J A E. Reactions to hemorrhage. *Am J Physiol* 56:1 15, 1921
- 10 Stead E. The response of normal subjects to acute blood loss and the mechanism of the restoration of blood volume. *Arch. Int. Med.* (in press)

11. Dunphy, J. E. and Gibson, J. G., 2nd. The effects of replacement therapy on the pathologic changes in experimental traumatic shock. *Surgery* (in press).
12. Weiss, S. Syncope, collapse and shock. *Proc. Inst. Med. Chicago* 13:2-12, 1940.
13. Scudder, J. *Blood Studies as a Guide to Therapy*. 315 pp. Philadelphia: J. B. Lippincott Co., 1940.
14. Drew, C. R., Scudder, J. and Papps, J. Controlled fluid therapy: with hematocrit, specific gravity, and plasma protein determination. *Surg., Gynec. & Obst.* 70:859-867, 1940.
15. O'Shaughnessy, W. B. Analysis of the blood in cholera. *London Med. Gaz.* 9:486, 1832.
16. Atchley, D. W. and Loeb, R. F. Dehydration and medical shock. *M. Clin. North America* 17:1379-1391, 1934.
17. Stewart, J. D. Fluid therapy in surgery: a critical review. *New Eng. J. Med.* 215:53-59, 1936.
18. Collier, F. A. and Maddock, W. G. Water and electrolyte balance. *Surg., Gynec. & Obst.* 70:340-354, 1940.
19. Elkinton, J. R., Gilmour, M. T. and Wolff, W. A. The control of water and electrolyte balance in surgical patients. *Ann. Surg.* 110:1050-1066, 1939.
20. Gendel, S. and Fine, J. The effect of acute intestinal obstruction on the blood and plasma volumes. *Ann. Surg.* 110:25-36, 1939.
21. Beard, J. W. and Blalock, A. Experimental shock. VIII. Composition of fluid that escapes from blood stream after mild trauma to extremity, after trauma to intestines and after burns. *Arch. Surg.* 22:617-625, 1931.
22. Mahoney, E. B. Study of experimental and clinical shock with special reference to its treatment by intravenous injection of preserved plasma. *Ann. Surg.* 108:178-193, 1938.
23. Bond, D. D. and Wright, D. G. Treatment of hemorrhage and traumatic shock by intravenous use of lyophilic serum. *Ann. Surg.* 107:500-510, 1938.
24. Strumia, M. M., Wagner, J. A. and Monaghan, J. F. The use of citrated plasma in the treatment of secondary shock. *J. A. M. A.* 114:1337-1341, 1940.
25. Elkinton, J. R., Wolff, W. A. and Lee, W. E. Plasma transfusion in the treatment of the fluid shift in severe burns. *Ann. Surg.* 112:150-157, 1940.
26. Elman, R. Therapeutic significance of plasma protein replacement in severe burns. *J. A. M. A.* 116:213-216, 1941.
27. Mahoney, E. B.: personal communication.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27211

PRESENTATION OF CASE

A fifty-seven-year-old married nulliparous woman entered the hospital complaining of abdominal pain, nausea and vomiting.

Six years before admission, the patient had an attack of pain in the right upper quadrant of the abdomen, which was accompanied by nausea and vomiting and lasted for five days. Since that time she had had attacks of biliousness, characterized by epigastric fullness, nausea, headache and dizziness, which occurred perhaps once a month, followed by the ingestion of greasy foods, and were prevented by the elimination of these foods from her diet. Of recent months she had been slightly constipated, and one week before admission noticed the onset of general malaise and nausea. During the next three days the patient took several doses of saline cathartics with good results, but three days before admission she was seized with a crampy mid-epigastric and right upper-quadrant pain accompanied by abdominal distention and the vomiting of "yellow bile." Soon the pain became severer and more constant, and spread to involve the entire upper abdomen, but there was no constipation. Her physician administered a "strong hypodermic." The following day her condition was unchanged; pain and vomiting were still present, there were no bowel movements and her physician gave another hypodermic injection. The day before admission the pain shifted to the lower abdomen and was constant, colicky without radiation and located chiefly in the left lower-quadrant and suprapubic regions. When the patient attempted to rise from bed, she suffered severe pain in the rectum. Her physician recorded a temperature of 100°F. and found tenderness, especially in the left lower quadrant, with generalized rebound tenderness. During the day the patient had several bowel movements. On the morning of admission vomiting reappeared, the pain had eased slightly, but abdominal tenderness was more pronounced and she passed small amounts of gas by rectum. At no time had there been chills, jaundice or change in the color of her stools. During the illness there was some frequency with cloudy urine, but no reddening had been noticed.

The patient had had the usual childhood diseases, including scarlet fever and diphtheria. The family history was irrelevant.

On examination the patient was well developed and well nourished, sallow and drowsy. Her tongue was dry and coated, the breath having a questionably uremic odor. The heart and lungs were normal; the blood pressure was 100 systolic, 70 diastolic. The abdomen was somewhat distended, and there was no spasm; however, there was a slight generalized tenderness most marked in the left lower quadrant, where there was rebound tenderness. Peristalsis was hypoactive, with some high-pitched sounds, but no true tinkling. On pelvic examination, movement of the cervix produced considerable pain. Tenderness was present in both vaults, more marked on the left, and in each there was a small tender mass situated posteriorly, the one on the left being more prominent. Rectal examination revealed a large rectal shelf, with a well-defined, firm fixed mass posteriorly on the left. The feces were guaiac negative.

The temperature was 100°F., the pulse 95, and the respirations 25.

The urine was normal. The blood showed a red-cell count of 3,700,000 with a hemoglobin of 70 per cent, and a white-cell count of 12,600 with 89 per cent polymorphonuclears. The nonprotein nitrogen of the blood serum was 33 mg. and the protein 5.3 gm. per 100 cc., and the chlorides 97.5 milliequiv. and the carbon dioxide combining power 25.6 milliequiv. per liter.

A flat abdominal x-ray film showed gas-filled dilated loops of small bowel occupying the lower abdomen. The colon was practically empty.

An electrocardiogram showed a normal rhythm at 110 with a PR interval of 0.14 second. T₁, T₂ and T₃ were low or diphasic.

The patient was given intravenous fluids, and her condition remained unchanged until the second hospital day, when the abdomen was softer, and the peristaltic sounds infrequent and of normal pitch; a soft tender mass could be palpated in the left lower quadrant. The next day she was almost comatose, tracheal gurgles were present, and the temperature had risen to 104°F.; intravenous fluids were discontinued. A flat plate of the abdomen showed a decrease in dilatation of the loops of the small intestine.

Five days after admission the patient was much improved, the abdomen was soft and she passed three loose stools, but the white-cell count had risen to 25,600. From the time of entry, attempts to pass a Miller-Abbott tube beyond the stomach had failed, but on the fifth day it was visualized

within the jejunum and began to drain moderate amounts of thin brownish fluid. The next day tenderness had decreased in the left lower quadrant, but pelvic examination revealed an irregular fluctuant mass filling the pelvis to the brim and lying anteriorly and superficially on the left; there was only moderate tenderness. The loose stools continued, were composed of brown liquid containing mucus and gave a ++++ guaiac reaction. Examination of the chest revealed dullness, squeaks and groans, with increased vocal fremitus at the angle of the right scapula; the sputum contained a Type 20 pneumococcus. An x-ray film taken with a portable machine showed elevation of the right diaphragm, but no visible intrapulmonary disease except for a few areas of atelectasis on the right side. Chemotherapy was instituted, and in two days there was marked clinical improvement and the patient was able to take fluids by mouth, the temperature gradually dropping to normal and the white-cell count to 12,000. At the end of this period, however, she became apathetic, the temperature climbed to 103°F. and there were signs of consolidation in the right lower lobe, with rales at the left base. Another chest plate showed an area of density along the right border of the heart apparently in the medial portion of the middle lobe, which was believed to be due to partial atelectasis.

Two days later the patient was slightly disoriented and dyspneic, with a weak pulse. The abdomen was distended and somewhat spastic, with a little rebound tenderness. The firm mass in the left lower quadrant had increased in size, and peristalsis was hyperactive and tinkling; small amounts of feces continued to drain from the rectal tube. The cervix was fixed, and the firm mass, apparently continuous with the uterus, filled the pelvis. Both legs were edematous, the left more than the right. An abdominal film showed a small amount of air but no dilatation in the loops of the small intestine. Death occurred on the seventeenth hospital day, the temperature being 104°F., the pulse 130, and the white-cell count 18,000.

DIFFERENTIAL DIAGNOSIS

DR. ARTHUR W. ALLEN: Dr. Lingley, will you please show us the x-ray films?

DR. JAMES R. LINGLEY: This is the first abdominal film, showing gas-filled loops of slightly dilated small bowel.

DR. ALLEN: Can you see a gallstone anywhere?

DR. LINGLEY: No; there are no opaque stones. This is a later film, taken with a portable machine, which still shows some gas in the small bowel.

There is possibly a little less dilatation than previously. I do not see the mass spoken of in the pelvis on any of the films. This is the first chest film, showing a very high right diaphragm and some areas of density in the medial portion of the lung. This film, taken seven days later, shows an increase in the pulmonary process, and I believe that this density could be due to either atelectasis or pneumonia.

DR. ALLEN: Dr. Lingley has not been as much help as I hoped he might be. The patient, a fifty-seven-year-old woman, came to the hospital a week after the onset of some sort of acute abdominal illness. We naturally think of this long story of gallstone colic in relation to the present illness, and wonder whether by any chance a gallstone could have eroded through into the duodenum or into the small bowel somewhere to produce this picture. There are a good many things against this possibility. The history is not quite long enough. It usually takes about three weeks of right upper-quadrant difficulty or signs of an inflammatory process before the stone erodes into the intestines. When it gets there, it may produce intermittent obstruction and finally pass by rectum. Usually, however, the obstruction is very definite, and in this case it was never complete. In spite of the dilated loops shown on entry, this does not look like the type of obstruction that one gets with gallstone ileus. Besides, the patient had had good evacuations with saline cathartics, and also some movements after she had stopped taking cathartics.

What else could we have that might be associated with her probable gallstones? In a case of this sort, I think we should mention the possibility of pancreatitis, which the long history of epigastric pain and vomiting strongly suggests. I should have expected that the patient, however, if she had had pancreatitis, would have had a boardlike abdomen on admission and would have been more ill, and also that she would not have run the course described in the record. For instance, it would have been unlikely for her to develop a large pelvic mass in association with pancreatitis. I am therefore inclined to believe that this episode was not in any way related to her gall-bladder disease.

The next question that we must try to decide is whether this is a mechanical or an inflammatory obstruction; whether or not it is based on a malignant background is not so important. Obviously, in the minds of the men looking after this patient, there was some doubt whether she did have a mechanical obstruction and not just a secondary ileus, so that they started to decompress the up-

per intestinal tract quite correctly with a Miller-Abbott tube. I think the facts that she continued to have evacuations and that she had so much inflammatory reaction as evidenced by the temperature and white cell count, with the development of a mass in the lower abdomen, probably rule out mechanical obstruction such as we see associated with a band of adhesions. She had had no previous operations, which does not rule out mechanical obstruction but is one point against it. I believe we have to offer inflammation as the basis of obstruction. One condition that simultaneously produces the signs of intestinal obstruction and inflammation is an inflammatory process in Meckel's diverticulum, although I should have expected the course to be slightly different if this were an inflamed Meckel's diverticulum. However, the patient could have had the abdominal pain, the vomiting, the partial obstruction and the inflammatory pelvic mass from such a lesion. Fifty-seven is a little old for a Meckel's diverticulum to get a person into trouble.

There is another disease that I believe we must consider very seriously, although there are a great many odds against it, namely, diverticulitis of the sigmoid, and I have a feeling from the way the record reads that the patient was treated for this condition. She had epigastric pain at the onset, which is in order. Her pain and tenderness came down to the lower abdomen. Things were a little more concentrated on the left than on the right. The drawback to that diagnosis, as I see it, is this: if a diverticulitis of the sigmoid is sufficient to cause an abscess, complete large bowel obstruction occurs. This woman never had it, and I do not believe we can overlook that one feature. When she developed the mass in the pelvis she behaved like a patient who gets a residual pelvic abscess following appendicitis that produces diarrhea and the output of a great deal of liquid fecal matter.

We have no reason to suspect that the difficulties arose from any of the pelvic organs. The pelvic findings toward the end would not have been so masked and obscure as they appear to have been in this story.

The possibility of neoplastic disease is brought in with the use of the term "rectal shelf," which is usually applied to secondary malignant growths, primary in some other portion of the abdomen, implanted in the pelvis. The final course and description of this mass make it improbable that it was a malignant rectal shelf, and we otherwise have very little to support a neoplastic background. The patient had had no loss of weight or loss of strength, and the stools early in the examination

were negative for blood, so that I believe we can rule out cancer.

I believe we come down to the most frequent cause of an acute abdominal situation with inflammation and the development of pelvic abscess, and that is our old friend acute appendicitis. The severe epigastric pain was perfectly consistent with the onset of acute appendicitis. The sudden decrease in symptoms at the end of a few days was probably due to rupture of the appendix. At no time after the patient came into the hospital was she in any condition for exploration. I judge she was not operated on, and if the surgeons missed an opportunity to do her any good it was at the time that they might have drained a pelvic abscess. They described it so beautifully as a large mass filling the pelvis to the brim, fluctuant to the examining finger below. On this same day the x-ray film failed to show dilated loops of small bowel, which at times can give the impression of a pelvic abscess, therefore, it could not have been a dilated loop of small bowel that they were feeling by rectum.

The patient developed a Type 20 pneumonia. We have to take just a moment to consider the possibility that this woman had a so-called "idiopathic peritonitis" from the pneumococcus, resulting in this abscess. I mention this because it can occur in an adult. I have recently seen it in a man of thirty. The pneumonia was probably secondary and not primary, and I should be much surprised if we found in the end that she had an idiopathic peritonitis.

To come down to a final diagnosis, I shall put first, acute appendicitis with peritonitis and pelvic abscess, and second, diverticulitis of the sigmoid, with pelvic abscess. I think that we shall find that she did have gallstones, which were irrelevant and did not have anything to do with the story. Also she must have had pneumonia as a terminal disease.

DR BENJAMIN CASTLEMAN: Why did you rule out carcinoma of the sigmoid with pelvic abscess and perforation?

DR ALLEN: I did raise it as a possibility, and the thing that made me believe it probably was not a carcinoma was the lack of obstruction. This patient had mild ileus. I believe that if she had had a carcinoma of the sigmoid this woman would have had a large bowel obstruction if it was big enough and bad enough to produce a perforation, and in addition she should have had blood in the stools. It is also on this basis of lack of obstruction that I thought it was not diverticulitis of the sigmoid.

CLINICAL DIAGNOSES

Pelvic abscess, secondary to carcinoma of sigmoid with perforation?
 Diverticulitis of colon with abscess formation?
 Ovarian cyst?
 Intestinal obstruction.
 Terminal pneumonitis.

DR. ALLEN'S DIAGNOSES

Acute appendicitis, with peritonitis and pelvic abscess.
 Gallstones.
 Pneumonia.

ANATOMICAL DIAGNOSES

Acute appendicitis, with perforation.
 Pelvic abscess.
 Localized peritonitis.
 Bronchopneumonia, slight.
 Cholelithiasis.
 Arteriosclerosis, aortic and coronary.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: I am sorry we have none of the clinicians from the ward to discuss this case. The patient was admitted through the Emergency Ward, where she was seen by a surgeon. She was admitted on the medical service. The surgeons were called rather frequently in consultation throughout her hospital stay. At no time were they anxious to take her into their wards. The suspicions ran as Dr. Allen guessed—chiefly toward diverticulitis or cancer of the sigmoid, with secondary abscess formation.

At autopsy a large pelvic abscess was found, and floating free in its midst was the distal three quarters of the appendix. There was a wide open hole into the cecum, where its base had once been. There were also scattered pockets of pus between various intestinal coils, but no free fluid, no generalized peritonitis. It seemed probable from the autopsy findings that if she could ever have been got into condition to withstand any operation whatever, the abscess could have been drained through the rectum or vagina and she might have survived. The other findings at autopsy were not very striking. She had a considerable amount of arteriosclerosis, including some coronary sclerosis. The lungs were edematous and atelectatic and showed very little pneumonia, although there was a trace of it. She had three gallstones, each about 1 cm. in diameter.

DR. GORDON A. DONALDSON: She would have been drained if she had not developed a pulmonary infection. I believe the surgeons thought

she had a twisted ovarian cyst at that time and were reluctant to drain it because of the fact that the intestinal obstruction was decreasing.

CASE 27212

PRESENTATION OF CASE

A fifty-six-year-old Greco-American woman entered the hospital complaining of abdominal pain and vomiting. The history was obtained through an interpreter.

The patient was first seen in the Out Patient Department two and a half years before admission, at which time she complained of epigastric pain of four years' duration, which apparently occurred after meals. A Graham test showed a normally functioning gall bladder and no visible stones. One year later the patient again visited the Out Patient Department and stated that the attacks of epigastric pain were still present and appeared when her stomach was empty. It was worse in the morning, was not relieved by food, and was accompanied by gas and a feeling of "something jumping" in her stomach. The pain radiated through to the back and was almost severe enough to make her cry. Furthermore, the patient stated that she used laxatives frequently for constipation. On examination, there was tenderness in the left upper quadrant of the abdomen, and the liver was palpable one fingerbreadth below the costal margin; the examiner believed a hard mass was present below and posterior to the soft liver edge. The blood pressure was 160 systolic, 90 diastolic. A gastrointestinal series was negative, and examinations of the blood and urine were negative. The patient was seen a year later and six months before entry in regard to her tonsils, and again she complained of epigastric pain.

Two weeks before admission the patient began to suffer from sudden attacks of crampy abdominal pain accompanied by rumbling in the abdomen and the passage of gas by rectum. Vomiting of food just eaten appeared the next day. She remained in bed, and the symptoms increased so that the waves of pain occurred every few minutes and vomiting became almost constant. At the time of admission there had been no bowel movement for four days and not even the passage of gas for twenty-four hours.

At no time had blood been noticed in the vomitus or feces. The patient had lost 30 pounds in the past few years.

Eighteen years previously, a "large mass weighing 7½ pounds" had been removed from her abdomen. The family history was irrelevant.

On examination the patient was acutely ill and

suffering from spasms of severe abdominal pain, between which she seemed comfortable. The heart and lungs were normal; the blood pressure was 138 systolic, 70 diastolic. The abdomen was distended, and there were hyperperistalsis and ascites; borborygmus was associated with the pains. A surgical scar was present in the mid-line of the lower abdomen.

The temperature was 99°F., the pulse 98, and the respirations 25.

The urine was normal. The blood showed a red-cell count of 4,400,000 with a hemoglobin of 85 per cent, and white-cell count of 11,450. The blood Hinton reaction was negative.

A flat abdominal film showed several gas-filled loops of small intestine in the left upper quadrant. There was no evidence of cecal dilatation. A barium enema revealed no abnormality.

A laparotomy was performed on the day of admission. A small amount of free fluid was present in the abdomen, and innumerable implants of various sizes were seen on the small and large intestines and mesentery. The uterus did not appear to be enlarged, but it was surrounded by a mass of nodules. The entire small bowel was greatly dilated and thickened, as if by long-standing partial obstruction. The omentum lay in the upper abdomen and was adherent to the liver, which could not be palpated, but there were numerous nodules in the region. Owing to the extent of the disease, it was considered unwise to do a palliative bowel drainage. A biopsy specimen taken from the anterior peritoneum showed chronic inflammation.

Postoperatively the patient improved; there was no vomiting, and the bowel movements were satisfactory. The temperature varied between 99 and 103°F., and the white-cell count averaged 14,000. Gradually, however, abdominal discomfort returned, and a flat plate of the abdomen nine days postoperatively showed an unusually large amount of barium in the colon from the previous enema. Most of the barium lay in the right half of the colon, but it was also present in the descending colon, sigmoid and rectum. Markedly dilated loops of small intestine were seen in the mid-abdomen and upper abdomen. The following day another operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. GRANTLEY W. TAYLOR: I think we had better start with the x-ray examination.

DR. JAMES R. LINGLEY: This is the first abdominal film taken, showing gas-filled loops of dilated small bowel, forming a stepladder pattern in the left side of the abdomen. This finding is

constant in the succeeding examinations. There is possibly a little increase in density, suggesting a mass in the mid-lower abdomen. There also appears to be an area of narrowing in the upper sigmoid, which from the films might either originate in the bowel or represent involvement of the bowel from without.

DR. TAYLOR: We are concerned with a patient with a long-standing history of difficulty, chiefly referable to her gastrointestinal tract and upper abdomen, who suddenly developed an acute episode in the course of six days. Shortly before admission to the hospital, she had begun to have some evidence of weight loss. The original complaints were suggestive enough of gall-bladder disease to warrant investigation. But the Graham test showed normal function. It seems to me that that justifies us, even some years after the x-ray studies, in ruling out the gall bladder as having been responsible for her symptoms. There is some relation of the upper abdominal pain to the stomach, perhaps, in that the pain was more prominent when the stomach was empty. The pain radiated through to the back; I do not believe we can make much capital out of that at the present time. The other fact about the history is the removal of a tumor eighteen years before—a large mass weighing 7½ pounds. That was at the age of thirty-eight. It would have been of interest to know whether she had had normal menstruation following that removal. I think that should have been included in the history. At the time of laparotomy, no reference was made as to whether or not the ovaries were observed, or if so, what they looked like.

The patient came in quite obviously suffering from an acute obstruction, which the flat films bear out. It is of interest that there was no gas in the cecum, and it is reasonable to say that the diagnosis was certainly acute obstruction of the small intestine, with no obvious involvement of the colon. At examination, the patient was acutely ill. She had been obstructed for two weeks, and had been completely obstructed for four days, suffering from spasms of severe pain, between which she seemed comfortable. The abdomen was distended. Ascites and borborygmus were present with the pain. I suppose by ascites they mean shifting dullness. I do not consider ascites to be observable on physical examination; the evidences of it may be. The blood picture is interesting. The patient had had a long illness and an acute recent episode; yet the blood was quite normal. It may be that she was so dehydrated as a result of the emesis that the hemo-

globin represented a false level. A barium enema was described as showing no abnormality. Dr. Lingley points out an area suggesting a stenosing lesion high in the sigmoid, which I think we must keep in mind.

Laparotomy was performed at once, presumably for an acute obstruction. No mention is made of the use of a Miller-Abbott tube. Apparently the patient was so badly off that they thought that they had to operate at once, and perhaps start the tube at the same time. The laparotomy findings are very interesting. Free fluid was present, and innumerable implants of various sizes were seen. The small and large intestines and mesentery were all covered with them. One can recognize neoplastic implants in the abdomen, and sometimes numerous implants of various sizes are seen. The description does not convey very much to me. I should certainly have a clearer picture if I had seen them myself. If one had a case of tuberculous peritonitis, one could say that tubercles were implants and undoubtedly they would vary in size. One could describe the dissemination of echinococcal disease inside the abdomen as implants, and they would vary in size.

DR. TRACY B. MALLORY: Can you describe them a little more, Dr. Wallace?

DR. RICHARD H. WALLACE: They were grossly what you could call typical carcinomatous implants.

DR. TAYLOR: I presume so, and yet Dr. Wallace, who was concerned with the operation, presumably removed one of these from the anterior wall and it was proved not to be carcinomatous, so that he was certainly wrong in his interpretation of that one and he may have been wrong in his interpretation of all the rest of them.

I was about to say that in younger women you can see implants due to endometriosis—not so numerous as in this case, however. As I have previously mentioned, nothing is said about the ovaries. The uterus is described as not enlarged but surrounded by a mass of nodules. Were the ovaries there, or were they not seen because of the massive nodules? A tremendously dilated small bowel was found, but nothing is said about whether the colon also participated in this process or whether there was any collapse of the small bowel, any sharp transition.

If most of us were confronted with this situation, I believe we should have done exactly what Dr. Wallace did, that is, take a biopsy specimen and close up the abdomen, with the idea that we were concerned with widely scattered neoplastic implants and probably with obstruction at no one

point but at several places. Then we should have been as surprised as he was probably to have a pathologist's report of chronic inflammation of the tissue removed at operation.

The interesting point postoperatively is that the patient began to have a swinging temperature and more elevation of the white-cell count than before. She developed abdominal distention again and had obstruction, and then they found out that most of the barium was present in the colon from the enema that had been given some six days previously. I dare say at that time they may have scrutinized with more care that region in the sigmoid and decided that there might be carcinoma overlooked at the original operation. At any rate, another operation was performed, I presume with the thought of trying to relieve the obstruction, which then seemed to be more localized.

I have mentioned the non-neoplastic conditions that occur and that account for widely disseminated implantation of disease in the abdomen, namely, echinococcal disease, tuberculosis and possibly endometriosis. I do not believe we have to consider them. We have Dr. Wallace's assurance, and we have a pathological report that tends to rule them out just as completely or more completely than it rules out carcinoma. If we are dealing with carcinomatous implants throughout the abdomen, we must try to find a primary focus for the disease. We get very little help from the record in regard to where that primary focus probably was. We go back to the tumor removed eighteen years before to raise the question of whether the patient had ovarian neoplasm. Removing one ovary and leaving the other behind is very likely to be followed eventually, perhaps not after so long an interval as this, with malignant degeneration in the latter and the dissemination of implants. That is a very attractive diagnosis, because I suppose widespread intra-abdominal carcinomatous implants are more often due to ovarian carcinoma than to any other type as we see these cases surgically. However, many other areas may give rise to that type of dissemination. If we rule out the ovary, we think at once of the gastrointestinal tract—stomach, colon or rectum—as likely to give rise to widespread implantation. A negative gastrointestinal series was reported a year and a half before, but I think a carcinoma of the stomach could develop and become widely dispersed within that period. A suggestive area in the sigmoid colon and the presence of intestinal obstruction when she came in justify the assumption of involvement of the sigmoid. A carcinoma of the pancreas or biliary tract might develop in the ab-

domen rather silently and might progress to this extent, without interfering with the patient's well-being until there was widespread metastasis, but one would expect to have jaundice or some other evidence of a neoplastic process before this time. That is, I should expect either or both to have had liver metastasis before this widespread peritoneal implantation took place.

I neglected to mention the cecum specifically, but we know that a great many cecal carcinomas metastasize. I shall not consider it, however, because most of the obstruction was confined to the small intestines, and no mention is made of any mass in the cecal area. The only evidence in favor of carcinoma lower in the large intestine is the stricture or stenosis in the sigmoid colon.

I believe that, in spite of the negative biopsy of one of these nodules, the process is disseminated carcinoma. I believe that the patient had a carcinoma of the ovary, with disseminated implantation rather than primary involvement of the gastrointestinal tract. The obstruction was due to extrinsic infiltration of the bowel by this carcinoma.

DR. WALLACE: I operated on this patient with a diagnosis of acute small-bowel obstruction and found what I considered at the time very widespread metastatic disease. I was unable to palpate the liver or the region of the stomach because the omentum was adherent and had walled off the whole upper abdomen; its underside was a solid mass of nodules. Another mass of implants in the region of the terminal ileum was apparently chiefly responsible for the obstruction. There was also narrowing of the sigmoid in the site that Dr. Lingley has pointed out. The whole transverse colon was involved in the same process. There was no normal bowel with which to do a reasonable short-circuit operation, since there were implants down to the upper rectum. The peritoneum of the pelvis and around the uterus was one solid mass of nodules, and no ovary or ovarian tissue could be identified. I did not see the second operation. The patient continued to have symptoms of obstruction, and after ten days there was no great change. It was finally decided that it might be worth while to try to short-circuit the ileum to the upper rectum; this procedure was carried out apparently with great difficulty. The patient was not relieved, gradually went downhill, and died. Another interesting thing is that at the second exploration another biopsy was reported as showing chronic inflammation, although I do not believe there was any question in the minds of those who saw the inside of the abdomen that this was metastatic disease.

CLINICAL DIAGNOSES

Carcinomatosis.
Small-bowel obstruction.

DR. TAYLOR'S DIAGNOSES

Carcinoma of ovary.
Peritoneal carcinomatosis.
Small-bowel obstruction.

ANATOMICAL DIAGNOSES

Scirrhus carcinoma of stomach, signet-ring type, with multiple peritoneal implantations.
Intestinal obstruction.

PATHOLOGICAL DISCUSSION

DR. MALLORY: I might say that we have never been able to find anything that we could identify as carcinoma in either of the two biopsy specimens. At the time of autopsy, it was just as obvious to us as it had been to the surgeons that the patient was suffering from generalized carcinomatosis. We did have some advantage over the surgeons, and we were able to demonstrate that both ovaries were present. What the 7-pound mass was, I do not know. We found no trace of it. It may well have been a pedunculated fibroid. The primary site of the tumor was in the stomach. The lesser curvature was shortened to 10 cm. and was diffusely infiltrated with scirrhus carcinoma. There were many spots of obstruction throughout the intestinal tract, all due to serosal implantations. The maximum point of obstruction was probably in the region of the ileocecal valve, but the points of obstruction were so numerous that any satisfactory surgical relief would have been out of the question.

DR. TAYLOR: I recently read a paper describing the minute details of abdominal implantation of carcinomatous cells in the serous surfaces. Apparently, the implant imbeds and sets up inflammatory reaction of severe degree, accompanied by the formation of new blood vessels and new lymphatics. Thus the early nodule consists almost entirely of inflammatory tissue, and the actual cancerous focus may be overlooked by paying too much attention to the infiltration.

DR. MALLORY: I think that is quite possible. This cancer was of the signet-ring type. These cells spread individually and widely. An occasional signet cell does not look very different from a monocyte, and single cells may be quite difficult or impossible to recognize.

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MASSACHUSETTS COMMITTEE ON PUBLIC SAFETY

THE co-operation of Massachusetts physicians is essential if the work of the Massachusetts Committee on Public Safety is to be successful. It is hoped and urged that physicians in every community will help the committee in the difficult task of organizing civilian and medical preparedness, in accordance with the program briefly outlined in a letter appearing in this issue of the *Journal*.

NEUROPSYCHIATRIC DISORDERS AND THE SELECTIVE-SERVICE-BOARD PHYSICIAN

THE casualties of World War I were not accounted for only in the number of men killed

and physically injured. Under the strain of military service and warfare, thousands of men broke down nervously so as to be useless in the fighting forces, and a large percentage of these, as chronic mental or nervous invalids, have been cared for ever since at governmental expense.

If the occurrence of such casualties were in no way predictable, if the man who is destined to become shell-shocked were as much subject to the laws of chance as the man who is killed or physically injured in a certain engagement, the whole matter of nervous invalidism under conditions of war would have to be considered one of the inevitable contingencies and unpreventable circumstances of the abnormal situation.

Statistical data relevant to neuropsychiatric disorders that developed in the United States Army during the last war indicate, however, that in an arrestingly large percentage of such disorders there had been a history of nervous or mental instability or neurologic defect long before the men entered military service. As reported in an article in this issue of the *Journal*, 85 per cent of 50,000 patients with neuropsychiatric disorders that apparently developed during the term of service had had symptoms relating to the disorders for at least five years before the beginning of military service. Furthermore, of a total of 69,394 neuropsychiatric patients found in examination of 3,500,000 soldiers, 96 per cent had disabilities that did not arise in line of duty.

Such evidence is conclusive proof that so-called "shell shock" does not come out of the sky, hitting this man or that man unpredictably, as shell fragments or bullets do. The significance of the experience gained from the last war is, of course, that adequate neuropsychiatric examination of the men about to be inducted into service will probably in large measure eliminate those who may become a liability in the country's defense and who may become a drain on governmental funds for years to follow. The importance and commonsense necessity for alertness and awareness, on the part of the examining physicians, concerning signs of nervous instability, mental deficiency and neurologic disease in the men who are being examined cannot be too strongly emphasized.

Because of the haste created by the present national emergency, men are being inducted into the United States Army following a relatively superficial examination. As a rule, they do not see a specialist in neuropsychiatry until they arrive at the induction station, just prior to going to camp. The induction examinations are necessarily hurried, and their adequacy depends chiefly on the acuteness, clinical acumen and extent of readily usable knowledge of the individual neuropsychiatrist.

It is these circumstances that make the position of the examining physician for the local selective-service board so relatively important. If he has in mind not only the finding of physical disease but also personality reactions and evidence of neurotic or psychotic tendencies and of subaverage intelligence, he himself may see reason to reject the unsuited man. If he is not able to decide on the fitness of the candidate, he has recourse to the medical advisory board, which has the time and facilities necessary for thorough examination.

Expert skill is not required to make the local-board physician watchful for indications of handicapping neurotic traits or of low mental caliber. A few simple questions about emotional reactions and school and work records will at least suggest whether further investigation is advisable. It is a mistake for the physician to shy away from considering personality disorders because of the misconception that this field belongs only to specialists. Most doctors have had sufficient experience with human nature to entitle them to the privilege of questioning the intelligence or the stability of the people with whom they come in contact. No harm—quite the contrary—is done by questioning, especially when it occurs before the final rush of induction-board activities.

The matter of mental deficiency should be carefully considered. The often-expressed idea that physically husky morons make the best soldiers is a fallacy. As a matter of fact, 12 out of every 1000 men examined in draft and camp groups in the last war proved to be unfit as soldiers because of mental deficiency. The warfare of today is said to depend more than previously on indi-

vidual initiative and intelligent co-operation; if this is true, the mentally deficient constitute even more of a liability. It is to the credit of the Boston Area Induction Board that a psychometrist is included in its medical personnel; he is able to judge the intelligence levels in doubtful cases.

Unfortunately, there seem to be no effective measurements for the quick determination of a man's capacity to fulfill the vocational duties of a soldier, even though the man is emotionally sound and of average intelligence. However, the evidence is that a workable ideal will be more nearly attained if men who are known to have personality defects are eliminated rather than put to the test of being made soldiers.

THE BOSTON MEDICAL LIBRARY: A HISTORY OF PROGRESS

In this issue of the *Journal* are two reports on the Boston Medical Library. The first is the report presented by the retiring president, Dr. Lincoln Davis, for 1933 through 1940; the second is that of the librarian, Dr. Henry R. Viets, for 1940, showing the present state of the library. The former is of special interest to readers of the *Journal*, many of whom are members of the library, since it covers a period of eight years during which the library passed through a state of financial crisis, now at least partially adjusted through the devotion of its officers and by donations from generous friends. In 1933, with a steadily falling income from invested funds and with a reduction in the number of members using the library, in addition to the piling up of debts accumulated over a long period of time, it is little wonder that the new president advocated the most stringent economies to meet the situation. Many adjustments were made immediately, and others as the subsequent years passed. Slowly, order has been restored, so that in 1941 Dr. Davis leaves his office to a successor, Dr. David Cheever, with the library in a greatly improved state.

The librarian's report indicates the steady growth of the library and its increased usefulness to the community. Much material of enduring worth was added to the library during 1940. The money

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out the production of any notable sputum, the eyes become sunken, the cheeks flushed, and the finger nails become curved and the fingers warm especially at the tips, in some cases the feet swell, there is no desire for food, and vesicles appear over the body

Hippocratic Succussion The pathognomonic significance of this sign in hydropneumothorax was unknown to the Father of Medicine and his school. The maneuver is described in several of the Hippocratic treatises. The quotation is from Book Two of the *Diseases* (Littre, 7:70, Kühn, 2:258, Fuchs, 2:438):

When fifteen days have elapsed from the onset, bathe the patient in hot water, place him on a firm seat, and let an assistant hold his hands while you, yourself, shake him by the shoulders so that you may hear on which side the sound of the disease may be perceived

R W B

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

ACUTE APPENDICITIS IN PREGNANCY, WITH A FATAL OUTCOME

A twenty three year-old para II was first seen when about ten weeks pregnant. Examination at that time showed a perfectly normal patient. The heart was not enlarged, there were no murmurs. The lungs were clear and resonant, there were no rales. The blood pressure was 120 systolic, 60 diastolic. The breasts and abdomen were normal. The uterus was in good anterior position.

Shortly after her first visit, the patient was again seen because of pain in the abdomen associated with nausea and vomiting. These symptoms were believed to be due to the pregnancy, and a diagnosis of an acute infection in the abdomen was not made until four days after onset. At that time she was sent to the hospital, where an operation was performed. There was no record of the temperature or white cell count. The patient died four days after the operation.

Autopsy revealed acute peritonitis, a gangrenous placenta in utero, bilateral acute salpingitis and an acute gangrenous appendix.

Comment This case illustrates that surgical complications occurring in pregnancy must be

diagnosed early and treated early. Pregnancy is no contraindication to operation. It is fair to assume that early operation would have prevented this fatality. Undoubtedly the salpingitis and the gangrenous placenta were secondary to the general peritonitis. Formerly, it was believed that the pregnant woman was immune to infections and certain other conditions that the nonpregnant patient might have. Of course this is untrue, and the maternal mortality statistics for Massachusetts for the years 1937, 1938 and 1939 show that there were 10, 13 and 5 deaths, respectively, due to acute surgical complications. Too often the knowledge that pregnancy exists obscures an underlying surgical condition. In the presence of an even slightly increased white cell count a temperature only moderately elevated and indefinite signs in the abdomen,—signs that do not make a specific diagnosis simple,—it is far better to explore than to delay too long. Acute appendicitis in pregnancy demands immediate surgery. Procrastination, as illustrated in this particular case, is apt to lead to a fatal result.

DEATHS

COPELAND—STANLEY E. COPELAND, M.D., of Worcester, died May 13. He was in his fortieth year.

Born in Worcester, Dr. Copeland graduated from Dartmouth College in 1925 and from Harvard Medical School in 1928. He was a member of the staffs of the Worcester City Hospital and Worcester Hahnemann Hospital. He was a member of the Massachusetts Medical Society and the American Medical Association.

His widow and daughter, two brothers and a sister survive him.

MATZEK—NEIL C. MATZEK, M.D., of Belmont, died May 13. He was in his forty sixth year.

Born in Milwaukee, Dr. Matzek received his degree from Tufts College Medical School in 1921. Formerly associated with the staffs of the Waltham and Symmes Arlington hospitals, he was a member of the staff of the Cambridge hospital, the Massachusetts Medical Society and the American Medical Association.

His mother, his widow, two children, two brothers and a sister survive him.

MISCELLANY

NOTES

At a recent meeting of the American Association of Physicians held at Atlantic City, Dr. James Howard Means, Jackson Professor of Medicine, Harvard Medical School was elected president for the ensuing year.

Erratum In the May 8 issue of the *Journal* it was announced that Dr. Walter B. Cannon had been awarded the Friedewald Medal of the National Gastroenterological Association, the society sponsoring the award was the American Gastro-Enterological Association.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

CORRESPONDENCE

MASSACHUSETTS COMMITTEE
ON PUBLIC SAFETY

To the Editor: The urgency of the present international situation has greatly accelerated the work of the Massachusetts Committee on Public Safety. Early in April, the medical division of the Massachusetts Committee on Public Safety sent out to the three hundred and fifty-three communities of Massachusetts directions concerning what each community should try to do in the way of medical preparedness. Compressed for the purpose of this letter, it broke down the medical division's efforts into three parts.

The first was the establishment of first-aid posts, either stationary or mobile units, in sufficient number according to the size of the locality. These posts should have physicians, nurses, nurse attendants and orderlies for full twenty-four-hour duty. These posts should be equipped with bandages, splints and the necessary materials for the immediate care of injured and gassed civilians.

Secondly, a transportation system to take the injured person from the first-aid post to the hospital should be planned. This transportation may be by ambulance or by any available vehicle that is adaptable to the needs of the locality.

Finally, the hospitals serving each community—and in those communities with no hospital the nearest hospital must suffice—should be prepared to handle any type of injury imposed by enemy action. Supplies in addition to those ordinarily on hand in time of peace must be put by. The staffs of the hospitals should be organized for a twenty-four-hour period of duty, perhaps best broken down into day and night shifts. This involves not only the physicians, but the nurses, nurse attendants, orderlies, dietitians and all others serving the hospital. Dentists must be included in the personnel, both in the hospitals and in the first-aid posts. Where there is an insufficient number of trained nurses, attendant nurses should be trained in attendant nurses' schools or through the excellent system of the Red Cross.

Already, replies on questionnaires attached to the original letters are coming in, and the number of towns that have no doctors and of course no hospital is surprising. Such towns are grouping together with adjoining communities and are doing the best they can to organize in accordance with the principles suggested for adequate civilian preparedness.

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The candidate kneels on a chair for Achilles-tendon reflexes, which are usually more reliable than knee jerks for ascertaining the integrity of the posterior columns and pyramidal tracts.

He sits and extends his legs for knee jerks (lumbar cord), while the examiner asks, "How far did you go in school?" (Stating the question at this time affords sufficient relaxation to check the knee jerks, which are especially valuable when the ankle jerks have not been satisfactory.) A maximum of sixth grade (normally completed at eleven or twelve years) or less, without adequate excuse (illness, work and so forth) suggests intellectual retardation.

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Vision and hearing are examined by the eye, ear, nose and throat specialist; any sensory and gross neurologic complaints are easily elicited through the following questions.

How do you feel?

Do you eat well?

How do you sleep? (Sleep and digestion are impaired first in neurotic persons.)

How are your stomach and your bowels?

Are you taking any medicine?

Do you have any aches or pains?

Does anything bother you?

How do you get along with girls? (If married, . . . with your wife?)

How many jobs have you had?

What is the longest time that you have spent on any one job? (A large number of jobs in a very

short time may suggest simple schizophrenia or a psychopathic inadequacy.)

How do you feel about this induction?

How do you feel about the Army?

Do you think that Germany should win? (This is asked if answers to the previous two questions are unenthusiastic, suspiciously noncommittal or unfavorable.)

Additional questions and time, when indicated, are in order, and are encouraged by the chief medical officer—especially when intellectual retardation is suspected from a history of limited schooling or from stupid responses to instructions during the examination. Thus, during an additional five minutes or so spent with the two or three dull inductees who are likely to be discovered in a group of fifty candidates, the following psychometric tests can be made:

Repeat six digits forward (twelve year test, Stanford)

Repeat five digits reversed (twelve year test, Terman-Merrill)

Give an acceptable definition—not too technical—of the abstract words, 'constant', 'courage', 'chirity', 'defend' (Terman-Merrill)

Name some rivers, cities and mountains in Massachusetts (Fernald) (Spelling of 'Massachusetts' has proved to be too great a stumbling block!)

Similarities (eleven year test, Terman-Merrill) The question is asked "In what way are rose potato and tree alike?" The same question for knifeblade, penny, piece of wire, or wool, cotton and leather and for book, teacher and newspaper

The ball and field test (superior plan for thirteen year level, Terman-Merrill, twelve year level, old Stanford), if presented as the problem of locating an unexploded bomb in a large circular enclosure would doubtless be very valuable, if it were not too time consuming

The commonest positive findings are linguistic handicaps in recent immigrants, sympathetic overstimulation (lost hands, hyperactive tendon reflexes and hyperemia), intellectual retardation (noted in 3 to 5 per cent of the inductees, with about 2 or 3 per cent rejected on this account)

Despite my bias against even attempting any kind of neuropsychiatric examination in less than thirty minutes with a candidate, I am obliged to conclude after examining 100 men, that in the vast majority of cases it is possible to make a reasonably reliable estimate of the neuropsychiatric assets of a candidate within five minutes.

The routine has been modified somewhat in indications arranged and some examinations have required much more time than many of them, however, have actually required less than five minutes.

Dr. Aronoff has informed me that my experience has been shared by the other neuropsychiatrists who have been examining at this center and I have no doubt that this report will be news only to the general physician and not to those neuropsychiatrists who have not been faced with a similar challenge.

Greeting the applicant with a smile, and the correct pronunciation of his name (ask him if in doubt) in addition to passing the time of day (Good morning, Mr. X) does much to build up rapport, a handshake and Good luck, Mr. X, at the close of the interview have proved very valuable, inasmuch as a smiling candidate who leaves the examining room with a "Thanks Doc" has a better effect on the rest of the men waiting outside,

not to mention its psychotherapeutic value to the future soldier.

It is important to remember that the essential distinction between these and ordinary neuropsychiatric examinations is that the overwhelming majority of these inductees do not (except in rare cases) have any complaints for which a differential diagnosis would be indicated. For this reason well over 90 per cent of them give negative findings and can therefore be disposed of with considerable ease and promptness.

Finally, I have observed that my own fatigue, which was quite marked at the end of each of the first two sessions, has not been noticed since then, so that, although I consider forty examinations a day to be the maximum load, it is not impossible or too difficult to handle fifty in a four hour session.

CALVERT STEIN, MD

121 Chestnut Street
Springfield Massachusetts

REPORT OF MEETING

CUTTER LECTURE

A Cutter Lecture on Preventive Medicine was delivered at the Harvard Medical School on March 7 by Dr. Ernest W. Goodpasture, of Vanderbilt University. His subject was Intracellular Infection and Some of Its Possible Implications. At present there is much evidence in favor of the necessity of an interrelation of the living cell and virus for the propagation of the latter. This same dependence is now known to hold in regard to certain protozoa, and recently some bacteria have been demonstrated to need a living cell, whereas others benefit from this relation, especially in regard to invasion.

Before discussing the evidence for these latter statements, Dr. Goodpasture described the chick-embryo method of studying pathologic processes. The perpetuation of various bacteria on this medium and their growth in the characteristic tissue of the human disease were discussed. It has thus been found possible to reproduce certain phases of human diseases especially the hitherto unexplored incubation period, on this medium. It has also proved beneficial in studying portals of entry and of measuring the potency of immune serum, since the chick embryo contains no antibodies or complement. It was suggested by Dr. Goodpasture that the method will therefore give a clearer idea of the mechanism of chemotherapy and prove more practical than *in vitro* experiments for antibody titer, and possibly will afford a new classification of bacteria based on a bacteria-cell interrelation.

On this latter basis the speaker has tentatively arranged certain familiar bacteria into three groups: extracellular, facultative extracellular or intracellular and obligate intracellular organisms. In the first group are *Corynebacterium diphtheriae*, *Staphylococcus aureus*, pneumococcus and *Streptococcus haemolyticus*. Slides were shown to demonstrate the well known necrotic action of diphtheria toxin and the protection afforded by antitoxin through better phagocytosis, the early leukocytic and exudative reaction with fixation abscess in infections due to *Staph. aureus*, the early monocytic reaction against the streptococcus, which is inhibited by the elaborated toxin and thus allows invasion and the inhibition of the pneumococcus by intracellular life. Among the organisms capable of either type of existence were demonstrated *Str. viridans* and the meningococcus both of which penetrate and destroy in either environment. An organism from a case of human

CORRESPONDENCE

MASSACHUSETTS COMMITTEE
ON PUBLIC SAFETY

To the Editor: The urgency of the present international situation has greatly accelerated the work of the Massachusetts Committee on Public Safety. Early in April, the medical division of the Massachusetts Committee on Public Safety sent out to the three hundred and fifty-three communities of Massachusetts directions concerning what each community should try to do in the way of medical preparedness. Compressed for the purpose of this letter, it broke down the medical division's efforts into three parts.

The first was the establishment of first-aid posts, either stationary or mobile units, in sufficient number according to the size of the locality. These posts should have physicians, nurses, nurse attendants and orderlies for full twenty-four-hour duty. These posts should be equipped with bandages, splints and the necessary materials for the immediate care of injured and gassed civilians.

Secondly, a transportation system to take the injured person from the first-aid post to the hospital should be planned. This transportation may be by ambulance or by any available vehicle that is adaptable to the needs of the locality.

Finally, the hospitals serving each community—and in those communities with no hospital the nearest hospital must suffice—should be prepared to handle any type of injury imposed by enemy action. Supplies in addition to those ordinarily on hand in time of peace must be put by. The staffs of the hospitals should be organized for a twenty-four-hour period of duty, perhaps best broken down into day and night shifts. This involves not only the physicians, but the nurses, nurse attendants, orderlies, dietitians and all others serving the hospital. Dentists must be included in the personnel, both in the hospitals and in the first-aid posts. Where there is an insufficient number of trained nurses, attendant nurses should be trained in attendant nurses' schools or through the excellent system of the Red Cross.

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NEW ENGLAND HEART ASSOCIATION

The next meeting of the New England Heart Association will be held at the Evans Memorial Hospital on Monday, May 26, at 8:15 p.m.

PROGRAM

Presentation of cases. Dr. James M. Faulkner.
Studies on the Third Heart Sound. Dr. Norman H. Boyer.

Perforation of Interventricular Septum: Report of four cases Drs. G. Kenneth Mallory, William G. Peacher and Charles F. Branch.

The Nature of the Arterial Hypertension Produced by Administration of Angiotonin to Normal Subjects. Dr. Robert W. Wilkins.

Pericardiotomy for Purulent Pericarditis. Dr. John W. Strieder.

Cardiac Failure Due to Inter-capillary Glomerulosclerosis. Drs. Harold J. Jeghers and O. J. Wolleman.

Interested physicians and medical students are cordially invited to attend.

CONSULTATION CLINICS FOR CRIPPLED CHILDREN IN MASSACHUSETTS, UNDER THE PROVISIONS OF THE SOCIAL SECURITY ACT

CLINIC	DATE	CLINIC CONSULTANT
Lowell	June 6	Albert H. Brewster
Gardner	June 10	Mark H. Rogers
Haverhill	June 11	William T. Green
Pittsfield	June 16	Frank A. Slowick
Northampton	June 18	Garry deN. Hough, Jr.
Brockton	June 19	George H. Van Gorder
Worcester	June 20	John W. O'Meara
Fall River	June 23	Eugene A. McCarthy
Hyannis	June 24	Paul L. Norton

EXAMINATIONS FOR APPOINTMENTS IN THE MEDICAL CORPS OF THE UNITED STATES NAVY

The next examination for appointments as assistant surgeon (lieutenant, junior grade), United States Navy Medical Corps, will be held at all major Medical Department activities on August 11 to 15, inclusive. Applications for this examination must be received at the Bureau of Medicine and Surgery, Navy Department, Washington, D. C., not later than July 15.

Applicants for appointment as assistant surgeon must be citizens of the United States, more than twenty-one but less than thirty-two years of age at the time of acceptance of appointment, and graduates of a Class A medical school who have completed at least one year of intern training in a hospital accredited for intern training by the Council on Medical Education and Hospitals of the American Medical Association.

A circular of information listing physical and other requirements for appointment, subjects in which applicants are examined, application forms and other data pertaining to salary, allowances and so forth may be obtained from the Bureau of Medicine and Surgery on request.

An examination for appointment as acting assistant surgeon for intern training in naval hospitals accredited for intern training by the Council on Medical Education and Hospitals of the American Medical Association will be held at all major Medical Department activities on June 23 to 26, inclusive. Students in Class A medical schools who will complete their medical education this

year are eligible to apply for these appointments, and if successful will receive their appointments approximately after the date of the examinations. Students in Class A medical schools who will have completed their third year of medical education this year are eligible to take this examination, and if successful will receive their appointments on or about July 1, 1942, after they have completed their medical education.

Applicants for appointment as acting assistant surgeon for intern training must be citizens of the United States, more than twenty-one but less than thirty-two years of age at the time of acceptance of appointment. Acting assistant surgeons are appointed for a period of eighteen months. After the appointee has served as an intern in a naval hospital for twelve months, he is eligible for and may take the examination for appointment as assistant surgeon.

A circular of information listing physical and other requirements for appointment as acting assistant surgeon, subjects in which applicants are examined, application forms and so forth may also be obtained from the Bureau of Medicine and Surgery on request.

Assistant surgeons and acting assistant surgeons for intern training are appointed in the rank of lieutenant (junior grade), Medical Corps, United States Navy. The pay and allowances for an officer of this rank total \$2699 per year if he has no dependents, and \$3158 per year if he is married or has dependents.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, MAY 25

MONDAY, MAY 26

- 12-15 p.m. Clinicopathological conference Peter Bent Brigham Hospital amphitheater
- *8-15 p.m. New England Heart Association Evans Memorial Hospital, Boston

TUESDAY, MAY 27

- *9-10 a.m. Secretin Test of Pancreatic Function Dr. A. S. Hartwell Joseph H. Pratt Diagnostic Hospital
- 12-15 p.m. Local Health Councils Dr. Garry deN. Hough, Jr. Massachusetts Central Health Council Hotel Sheraton, 91 Bay State Road, Boston
- 12-15-15 p.m. Clinicooncogenologic conference Peter Bent Brigham Hospital amphitheater

WEDNESDAY, MAY 28

- *9-10 a.m. Hospital case presentation Dr. S. J. Thannhauser Joseph H. Pratt Diagnostic Hospital
- *12 m. Chantopathological conference Children's Hospital

THURSDAY, MAY 29

- *9-10 a.m. X-ray demonstration Dr. Alice Ettinger, Joseph H. Pratt Diagnostic Hospital
- 12 m. Boston Gastroenterological Society Joseph H. Pratt Diagnostic Hospital

FRIDAY, MAY 31

- *9-10 a.m. Hospital case presentation Dr. S. J. Thannhauser Joseph H. Pratt Diagnostic Hospital

*Open to the medical profession

- MAY 28-JUNE 2—American Board of Obstetrics and Gynecology Page 262, issue of February 6
- MAY 29-31—Medical Library Association Page 671, issue of April 10
- MAY 30-31—American Heart Association Hotel Statler, Cleveland
- MAY 30-JUNE 2—American College of Chest Physicians Hotel Statler, Cleveland
- JUNE 2—American Medical Golfing Association Page 785, issue of May 1
- JUNE 2-6—American Medical Association Cleveland
- JUNE 2-6—Woman's Auxiliary, American Medical Association Hotel Statler, Cleveland
- JUNE 4—Harvard Medical Alumni Association Page 750 issue of May 1
- JUNE 5—New England Hospital for Women and Children, Page 922

JUNE 22-24 — Maine Medical Association. Marshall House, York Harbor, Maine.

OCTOBER 13-24 — 1941 Graduate Fortnight of the New York Academy of Medicine. Page 834, issue of May 8.

OCTOBER 14-17 — American Public Health Association. Page 579, issue of March 27.

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

The Mask of Sanity: An attempt to reinterpret the so-called psychopathic personality. By Hervey Cleckley, B.A. (Oxon.), M.D., professor of neuropsychiatry, University of Georgia School of Medicine, Augusta, Georgia. 8°, cloth, 298 pp. St. Louis: The C. V. Mosby Company, 1941. \$3.00.

Textbook of Medicine. By various authors. Edited by J. J. Conybeare, M.C., D.M. (Oxon.), F.R.C.P., physician to Guy's Hospital, London. Fifth edition. 8°, cloth, 1131 pp., with 24 illustrations and 31 x-ray plates. Baltimore: Williams and Wilkins Company, 1940. \$7.50.

The Avitaminoses: The chemical, clinical and pathological aspects of the vitamin deficiency diseases. By Walter H. Eddy, Ph.D., professor of physiological chemistry, Teachers College, Columbia University; and Gilbert Dalldorf, M.D., pathologist to the Grasslands and Northern Westchester hospitals, New York. Second edition. 8°, cloth, 519 pp., with 28 illustrations and 40 plates. Baltimore: Williams and Wilkins Company, 1941. \$4.50.

First Aid in Emergencies. By Eldridge L. Eliason, M.D., Sc.D., professor of surgery, University of Pennsylvania School of Medicine, professor of surgery, University of Pennsylvania Graduate School of Medicine, and surgeon, University of Pennsylvania, Presbyterian and Philadelphia General hospitals. Tenth edition, completely revised and reset. 16°, cloth, 260 pp., with 126 illustrations. Philadelphia: J. B. Lippincott Company, 1941. \$1.75.

The Essentials of Applied Medical Laboratory Technic: Details of how to build and conduct an office or small hospital laboratory at small cost. By J. M. Feder, M.D., director of laboratories and Allergic Service, Anderson County Hospital, Anderson, South Carolina. *Blood and Plasma Transfusion.* By John Elliott, Sc.D., pathologist, Rowan General Hospital, Salisbury, North Carolina. 4°, cloth, 241 pp., with 83 illustrations. Charlotte, N. C.: Charlotte Medical Press, 1940. \$5.00.

The Rockefeller Foundation: A review for 1940. By Raymond B. Fosdick, president of the Foundation. 8°, paper, 64 pp. New York: The Rockefeller Foundation, 1941.

The Heart in Pregnancy and the Childbearing Age. By Burton E. Hamilton, M.D., cardiologist, Boston Lying-in Hospital; and K. Jefferson Thomson, M.D., associate physician, Metropolitan Life Insurance Company Sanatorium, Mount McGregor, New York, and research associate in medicine, Albany Medical College; with a section entitled "Delivery and Obstetrical After-Care of Cardiacs," by Frederick C. Irving, M.D., professor of obstetrics, Harvard Medical School, and obstetrician-in-chief, Boston Lying-In Hospital. 8°, cloth, 402 pp., with 35 figures and

22 tables. Boston: Little, Brown and Company, 1941. \$5.00.

Criminal Youth and the Borstal System. By William Healy, M.D., and Benedict S. Alper, of the Judge Baker Guidance Center, Boston. 8°, cloth, 251 pp. New York: Commonwealth Fund, 1941. \$1.50.

BOOK REVIEWS

La maladie de Besnier-Boeck-Schaumann; ses manifestations cutanées, ganglionnaires, pulmonaires, osseuses, oculaires, glandulaires, viscérales, nasales, nerveuses. Une nouvelle grande réticulo-endothéliose. By L.-M. Pautrier. 4°, paper, 341 pp., with 105 illustrations. Paris: Masson et Cie. \$2.05.

In his preface, Professor Pautrier indicts the classic dermatologist in the following terms: "La dermatologie de collectionneur de timbres rares ou de papillons n'offre plus aucun intérêt. Loin de créer dix maladies nouvelles chaque année, il faudrait en supprimer tout autant. Nos méthodes trop longtemps purement visuelles ont raffiné et dissocié comme à plaisir. On discute gravement sur la présence ou l'absence de telle petite squame, ou de telle papule, ou de telle tendance à l'atrophie pour diviser, subdiviser, créer des types nouveaux, des formes anormales. Nous sommes ainsi arrivés à nous créer un vocabulaire invraisemblable, que rebute les débutants, perdus dans les règles de ce jeu compliqué et que, si nous n'y prenions garde, ferait bientôt de nous la risée des autres disciplines médicales."

Such words are most refreshing coming from a noted dermatologist and give hope that the days of descriptive dermatology are drawing to a close. In its history, sarcoid or Hutchinson-Boeck's disease is a good example of the danger of missing the woods because of the trees. The present monograph has successfully drawn together all that is known at the present time concerning this particular malady. It is fully illustrated, and the reproductions of photographs of skin lesions and of the x-ray changes are unusually good. The photomicrographs, however, are not, in general, so well portrayed.

Professor Pautrier has covered in a thorough fashion the literature on the subject, although it must be suspected that at times he has not read papers in the original, since authors' names are not infrequently misspelled—particularly authors writing in other than French journals. On the other hand, it is a monograph that should be on the reference shelf of every dermatologist and every internist concerned with this interesting but relatively uncommon condition.

Unfortunately, owing to world conditions, it is probable that few copies can be obtained in this country at present.

Diseases of the Urethra and Penis. By E. D'Arcy McCrea, M.D., M.Ch. (Dub.), F.R.C.S. (Ireland), F.R.C.S. (Eng.). 8°, cloth, 306 pp., with 181 illustrations. Baltimore: Williams and Wilkins Company, 1940. \$6.50.

This book is an adequate account of the clinical aspects of diseases of the penis and urethra, accompanied by sufficient bibliographic references to bring the subject matter thoroughly up to date. Personal experiences of the author are only occasionally noted, so that the work represents almost wholly a compilation of material already in existence in most textbooks. This, together with the limitations of the subject itself, makes the book not worth an extensive review.

The New England Journal of Medicine

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VOLUME 224

MAY 29, 1941

NUMBER 22

DANGERS OF RADIATION WITHOUT BIOPSY OF BRAIN TUMORS IN CHILDREN*

Report of a Case

FRANC D. INGRAHAM, M.D.,† AND JAMES B. CAMPBELL, M.D.‡

BOSTON

THE following case report is presented in the hope that similar disastrous results may be avoided. The patient had a good prognosis in other respects, but the resulting total and permanent blindness in this case is owing, we believe, to the fact that radiation was performed for over two years in the mistaken belief that the brain tumor was a medulloblastoma. The practice of radiation without biopsy and decompression has been carried out to a considerable extent in and about Boston (seldom elsewhere) since the presentation in 1935, and publication in 1936, of a rather convincing paper¹ advocating this method of attack. There is no doubt whatever that in many cases the diagnosis thus made is correct, that the patient is spared the ordeal of exploratory operation, and is as well off in the end. We are convinced, however, that even one case similar to that presented here is sufficient reason for discarding any method of treatment that makes such a result possible.

CASE REPORT

An 8-year-old girl entered the Children's Hospital with a complaint of headache, vomiting and unsteadiness of gait of more than 2 years' duration. Two months after the beginning of her illness, she entered another hospital complaining of headache and vomiting; examination showed poor reaction of the pupils to light and accommodation, hyperactive reflexes and a sustained right-ankle clonus. The history and signs suggested a mid line cerebellar tumor, and a diagnosis of medulloblastoma was made and x ray therapy recommended. The patient was given radiation as follows: at the beginning, 600 r to each side of the head; 4 months later, 600 r to these areas, 600 r to the posterior field directed at the cerebellum, 600 r to the cervical dorsal spine and 600 r to the dorsal lumbar spine, 6 months later,

600 r to each of the two lateral fields centered on the cerebellum; and 5 months later, 800 r to the same fields.

Four months after the completion of this treatment, the patient appeared in the Medical Out Patient Department of the Children's Hospital complaining of headache and vomiting, but the fact that she had been treated for a cerebellar tumor was not disclosed until her mother was questioned about the cause of the obvious alopecia. The signs at that time were characteristic of a cerebellar tumor; contact was made with the staff of the hospital where she was already under treatment, and she was returned to their care. Within a few days she received 800 r to the right and left cerebellar fields. A month later she received 600 r to the same fields and 600 r to the posterior cerebellar field. It was stated that "at first the patient responded rather well to the treatment, but after the last two series it appeared that she was becoming refractive, since there was little if any response, further treatment was therefore not given."

At the time of her last visit, the patient was found to have chronic papilledema, with secondary atrophy and distinct disturbance of co-ordination, so pronounced that she could hardly walk. She was given a very poor prognosis and told to return when necessary. A few days later, she was admitted to another hospital with the complaint of headache and vomiting. At this time, it was noticed that vision was very grossly impaired; the patient presented signs of high intracranial pressure, with cerebellar dysfunction. She was referred to the Children's Hospital, where she was admitted in a very poor condition, with very little vision remaining, and in almost complete prostration. A ventricular tap was done immediately after admission, and the fluid found to be under markedly increased pressure. Following this tap she improved considerably, and it was believed that she would tolerate a suboccipital exploration. This was carried out the day following admission, and a large cystic tumor was found extending into the mid line from the left cerebellar hemisphere. The cyst contained clear amber fluid such as is usually found in an astrocytoma. The cyst wall was fixed with Zenker's solution after evacuation, and the solid portion of the tumor removed. The patient made a satisfactory but rather slow convalescence, and was discharged from the hospital about 6 weeks after admission.

The pathological report was as follows:

On gross examination the specimen consists of nine fragments of soft, friable, pale yellow tissue of irregular

*From the Department of Surgery, Children's Hospital and Harvard Medical School.

†Neurosurgeon, Children's Hospital, instructor in surgery, Harvard Medical School.

‡Fellow in neurosurgery, Children's Hospital, assistant in surgery, Harvard Medical School.

shape, ranging from 5 to 10 mm. in average diameter. Formalin section, done on one fragment, shows tissue to be consistent with that of an astrocytoma. The material is fixed in Zenker's fluid and formalin.

Fifteen sections were made and stained with eosin and methylene blue, phosphotungstic acid and hematoxylin, and aniline blue. Microscopically, the greater part of the sections consist of well-preserved, fairly homogeneous, neoplastic tissue. The predominant cell is stellate, with a round or oval vesicular nucleus and a small, deeply basophilic nucleolus. Two or three delicate fibrillar processes extend from a scanty cytoplasm. In some places the processes terminate along walls of small blood vessels. These fibrils, together with coarser fibers, comprising a loose intercellular substance, stain blue with phosphotungstic acid and hematoxylin. No mitoses are seen. The cells do not form rosettes, palisades or other characteristic configurations. There is moderate vascularization of the tumor, with small areas of epithelial proliferation and calcification in some of the vessels. Small areas of recent hemorrhage are scattered throughout.

Diagnosis: fibrillary astrocytoma.

With this case history, we should like to present some of the data from our series of intracranial tumors, which suggest that it is impossible to make

TABLE 1. *Variation in Classification of 104 Consecutive Brain Tumors.*

DIAGNOSIS	NO OF CASES
Pituitary adenoma	1
Unclassified glioma	1
Myxosarcoma of sphenoid bone	1
Astrocytic hamartoma of cerebrum	1
Lipoma of cerebrum	1
Fibrosarcoma of cerebrum	1
Hemangioma of cerebrum	1
Hemangioendothelioma of cerebrum	1
Neuroblastoma of cerebrum	1
Neuroblastoma of cerebellum	1
Neuroblastoma of 3rd ventricle	1
Teratoma of cerebrum	1
Teratoma of cerebellum	1
Ependymoma of all ventricles	1
Spongioblastoma multiforme of pons	1
Medulloblastoma of 4th ventricle	1
Ependymoblastoma of cerebrum	2
Medulloblastoma of 3rd ventricle	2
Astrocytoma of 4th ventricle	2
Ependymoma of cerebrum	3
Hemangioma of cortex	3
Spongioblastoma multiforme of cerebrum	3
Spongioblastoma multiforme of cerebellum	3
Astrocytoma of pons	4
Astrocytoma of 3rd ventricle	5
Ependymoma of 4th ventricle	6
Medulloblastoma of pons	7
Astrocytoma of cerebrum	8
Craniopharyngioma	9
Medulloblastoma of cerebellum	11
Astrocytoma of cerebellum	20
Total number of astrocytomas	39
Total number of medulloblastomas	21

an accurate pathological diagnosis preoperatively, and that some of the prevalent ideas about intracranial tumors of children are incorrect.

In the first place, there is a general impression that medulloblastoma, which everyone agrees is radiosensitive and an almost hopeless surgical lesion, is the common intracranial tumor of childhood. In our series of 104 verified tumors (Table 1), there have been 21 children with medulloblastomas and 39 with astrocytomas. The patients were

all under fifteen years of age. In the older age groups, the incidence of medulloblastomas falls off rather rapidly. For the age group in question, this difference is not unique. The figures are very similar in Bailey, Buchanan and Bucy's series (30 astrocytomas, 13 medulloblastomas) and in Cushing's series (40 astrocytomas, 24 medulloblastomas).

The other important phase of the question is an analysis of histories of these patients, particularly with regard to duration of symptoms.

Figure 1 presents a contrast between the history as originally presented and as interpreted after special study in each case. One pair of columns represents one patient, the solid column representing the real duration of symptoms, the broken one the duration as originally presented by the family. Obviously, the majority of patients with astrocytomas present histories of symptoms of longer duration than those with medulloblastomas. So far as any individual case is concerned, it is quite impossible to determine the pathological diagnosis preoperatively.

Another item of importance is that some patients, particularly children with cerebral tumors, present apparently unmistakable cerebellar signs: 12 of our patients with supratentorial lesions had predominantly cerebellar signs. This is not an unusually high percentage in this age group; this pitfall was described with numerous examples by Bailey⁴ in 1924. Cushing⁵ had a striking example of this source of confusion in a small child with a large craniopharyngioma; in this case, the cerebellar signs were so striking that the surgeon who had previously treated the patient had tapped the cyst through a cerebellar approach. Certainly these patients would not be improved by radiation of the whole central nervous system, which is the routine treatment for medulloblastoma.

We realize that when radiation is started in the presumed medulloblastomas the plan is not to continue it unless there is a favorable response clinically. The case reported above illustrates very well how impossible it is to judge by the apparent response to the first ten days' treatment whether the diagnosis is correct. The record states that "at first the patient responded rather well to the treatment, but after the last two series it appeared that she was becoming refractive." The improvement was presumably owing to the fact that the coronal suture had separated widely at about that time. Even without the separation of the sutures, it is not uncommon to have unexplained spontaneous remissions in an otherwise steadily progressive course. It is not at all clear how such remissions can be distinguished from the beneficial effect of x-ray treatment, and there is therefore no

justification for depending on this improvement for a verification of diagnosis

In view of these several considerations, we consider a biopsy essential for an accurate diagnosis. Since a biopsy cannot be made safely without a decompression, a second important factor is taken care of—additional room, which should be pro-

vided with suspected brain tumors are given a trial course of x-ray therapy in less central and less expertly controlled clinics

It should also be noted that because of the local emphasis on this type of management medical students go through school with the impression that this procedure is generally accepted, whereas,

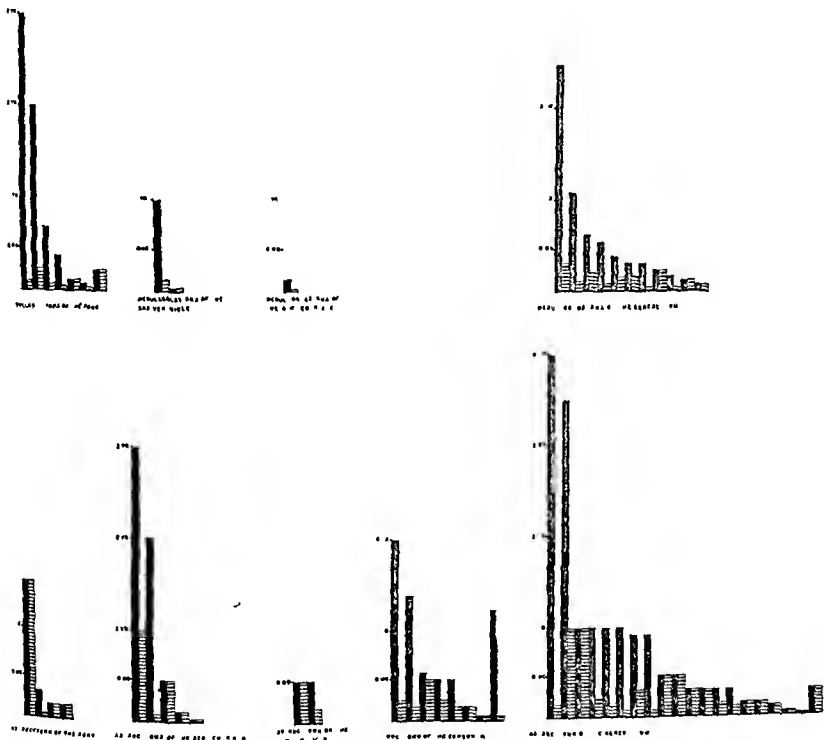


FIGURE 1 Differences in the Reported and Actual Duration of Symptoms

vided if radiation is indicated when an accurate histologic diagnosis has been made

We are not interested in emphasizing an error made by one surgeon or one clinic. As an advocate of this procedure has suggested, one mistake does not invalidate a method. This is certainly true, but the important point is that one cannot hope to have patients under better control or under more careful supervision than in the clinic where this patient was treated. Therefore, one must expect still more disastrous results when patients

actually, it is not generally accepted or approved throughout the United States

REFERENCES

1. Cutler E. C., Sosman M. C. and Vaughan W. W. The place of radiation in the treatment of cerebellar medulloblastoma: report of twenty cases. *Am J Roentgenol* 35:429-453 1936
2. Bailey P., Buchanan D. N. and Bucy P. C. *Intracranial Tumors of Infancy and Childhood* 598 pp. Chicago: University of Chicago Press 1939
3. Cushing H. The intracranial tumors of preadolescence. *Am J Dis Child* 33:551-584 1927
4. Bailey P. Concerning the cerebellar symptoms produced by suprasellar tumors. *Arch Neurol & Psych* 11:137-150 1924
5. Cushing H. personal communication

A STUDY OF THE SLIPPING-RIB-CARTILAGE SYNDROME*

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THE purpose of this paper is to call attention to an abnormal mobility and deformity of the anterior ends of the lower costal cartilages that cause painful symptoms, and to report cases observed over a period of twenty-seven years, emphasizing particularly persistent cases relieved by a simple operative procedure.

It should be understood that this particular syndrome has reference to the anterior ends of the rib cartilages and with the interchondral articulations, and is in no way concerned with the osteochondral junction of the anterior ends of the ribs, and that, barring anomalies, mistakes in numbering the ribs and exceptions, it has to do with the eighth, ninth and tenth rib cartilages only.

This symptom complex was first reported by Cyriax,¹ of London. He specifically mentions 3 cases, all treated expectantly. In 1922, Davies-Colley,² of London, under the original title, "Slipping Rib," reported 2 cases of displacement of the anterior end of the rib cartilage, which he had operated on by resection of the loosened cartilage with "complete relief of symptoms." From this time until 1924, 8 other cases by five authors³⁻⁷ were reported in the *British Medical Journal*. In 1931, Bisgard,⁸ of Chicago, referred to Davies-Colley's² article and other published cases, and reported 1 case, which he had operated on with cure. In the same year, Darby,⁹ of Vancouver, Washington, referred to Bisgard's publication and described a typical case of slipping rib cartilage that was also operated on by resection of the cartilage and followed by relief of pain.

This makes a total of 15 cases reported from 1919 to 1931, 8 of which were operated on by resection of the cartilage, with complete relief of symptoms.

Davies-Colley noted:

It is probably not a rare condition and is a trivial enough complaint in itself but it gives rise to most irksome symptoms. . . . In its [the pain's] position at the costal margin it resembles that due to so many deeper lesions of the abdomen and thorax, that I think it is quite likely that many cases occur in which such an apparently unimportant cause as a movable rib cartilage is unsuspected and the diagnosis missed.

Slipping rib cartilage is apparently of fairly common occurrence, and often produces irksome, in-

capacitating symptoms. It is diagnosed by physical examination, and cured by a simple operative procedure. As stated by Davies-Colley, "it is curious that it should receive no recognition in modern textbooks of surgery," and by Bisgard, "it has received but little attention in medical literature."

Because of failure to recognize this symptom syndrome, needless laparotomies have been performed, and prolonged suffering and incapacity

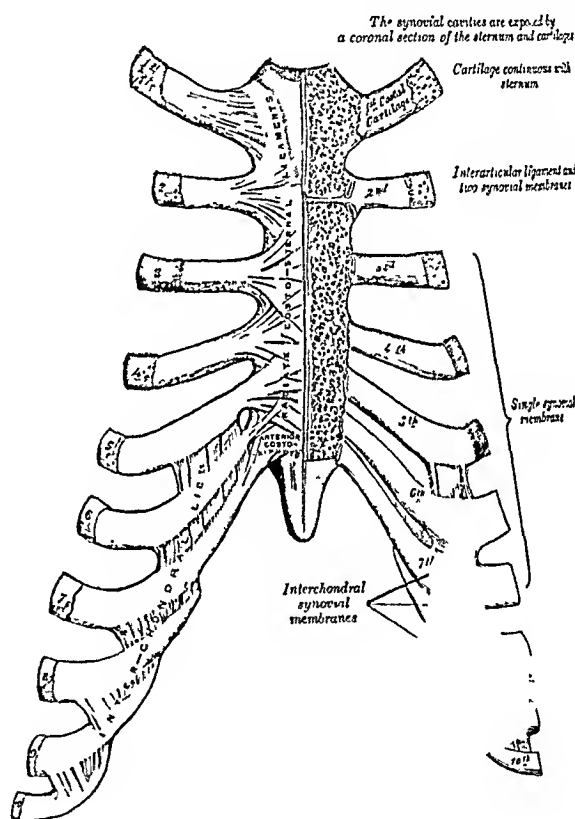


FIGURE 1. Sternocostal and Interchondral Articulations: Anterior view.¹¹ (Reproduced by permission of the publisher.)

from an easily curable condition are often permitted. Moreover, there does not appear to be any clear conception of the development of this deformity. These facts justify an attempt to secure a better understanding and more general recognition of this entity.

This loosening deformity involves the costochondral cartilages of the lower ribs, notably the eighth, ninth and tenth, either by displacement of fracture fragments or dislocation of the cartilage, or more often by curling of the end of the loosened

*One of the two essays awarded the Pray and Burnham prizes for 1940 by the trustees of the New Hampshire Medical Society.

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cartilage, so that on respiration or motion the deformed end slips over or rubs against the inside of the rib above, with a click that is felt by the patient and, in some cases, with a severe and incapacitating pain.

Figure 1 shows the framework of the anterior chest wall; the anterior ends of the cartilages of the eighth, ninth and tenth ribs are usually attached to the one above, not by cartilaginous union, but by a fibrous hammock surrounding the interchondral synovial membranes of the interchondral articulations that lends to the desirable mobility of the anterior chest. At the same time, however, it has the instability characteristic of any joint, and hence the susceptibility to trauma.

Lilienthal¹⁰ states that "the weakest part of the thorax is along the costochondral line on either side." This is an important observation in the consideration of cause and effect.

ETIOLOGY

Abnormal mobility of these rib cartilage ends may begin acutely as a result of fracture or dislocation of the cartilage, or more often as a partial separation of the fibrous attachment. On the other hand, it may be the result of multiple injuries, which have stretched the fibrous attachments over a period of time—as from golfing or one-sided weight carrying. That trauma, direct or indirect, is the etiologic background seems reasonable.

Deformity of the loosened cartilage end may result from displacement of a fracture or dislocation, as will appear in one case reported, but is more often due to a *clac* upward of the loosened cartilage end—so it rises above the contiguous rib cartilage, *anically* slipping out and in over the superior *ulage* on certain movements of the chest, *us*, or by digital manipulation, with a *ch* pain that is diagnostic.

From a review of 33 cases, 15 reported and 18 of my own, it appears that slipping rib cartilage occurs more frequently from indirect than from direct trauma, there being 13 of the former and 6 of the latter; in 2 cases, both direct and indirect force were in evidence. Of the 12 other cases reported, no attempt was made to ascribe the cause, owing, I believe, to incomplete histories.

A sudden blow of the steering wheel of an automobile against the lower ribs is one method of direct injury. Indirectly it may be caused by sudden flexion, extension or twisting of the body; by repeated distortion of the body, as the one-sided weight carrying of an industrial worker; by a sudden pull on the arms, as in weight lifting or pushing; by repeated arm pulls, as in golfing; by forced compression or expansion of the chest,

as in childbirth or coughing; and by many other types of force.

In his original report of this entity, Cyriax¹ said:

Pain and tenderness produced by displacement of the anterior ends of the ribs or cartilages is doubtless due to irritation of the intercostal nerves in the vicinity, from which it may radiate to the posterior spinal nerves and thence to the thoracic or abdominal sympathetics.

Figure 2 shows the logic of this statement. According to Gray,¹¹ the intercostal nerves "pass for-

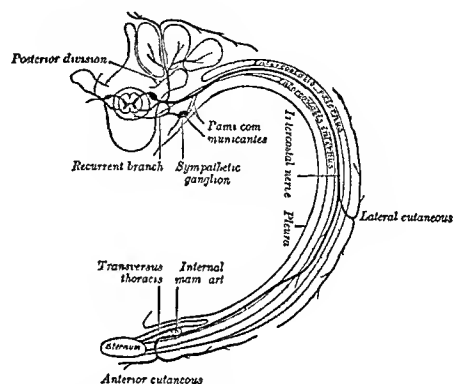


FIGURE 2 Diagram of the Course and Branches of a Typical Intercostal Nerve¹¹ (Reproduced by permission of the publisher)

ward in the intercostal spaces below the intercostal vessels." The description continues:

At the back of the chest they lie between the pleura and the posterior intercostal membranes but soon pierce the latter and run between these two planes of intercostal muscles as far as the middle of the rib. They then enter the substance of the *Intercostalis interni* and, running amidst their fibers as far as the costal cartilages, they gain the inner surface of the muscles and lie between them and the pleura. Near the sternum, they cross in front of the internal mammary artery and the *Transversus thoracis* muscle, pierce the *Intercostales interni*, the anterior intercostal membranes and *Pectoralis major*, and supply the integument of the front of the thorax over the mamma, forming the anterior cutaneous branches of the thorax.

Each nerve is connected with the adjoining ganglion of the sympathetic trunk by a gray and white *ramus communicans*.

Thus it is seen that the intercostal nerve lies very superficially on the inner surface of the anterior end of the rib and the rib cartilage, so that when the anterior end of the rib cartilage below becomes detached and deformed and slips up under the rib cartilage above, there is a strong

likelihood of nerve irritation. This probability is borne out by the fact that in every case reported, when the deformed cartilage is removed and clearance of the rib end established, the pain disappears immediately and permanently.

As cited by Cyriax,¹ and later by Davies-Colley,² the close association of the intercostal nerves with the sympathetic system accounts for frequent pain symptoms that suggest intra-abdominal or intrathoracic lesions, and has led to mistaken diagnosis.

Whether the synovial membranes of the interchondral joints that are involved in this slipping-rib-cartilage deformity contribute in any way to the pain manifested should be considered. So far, the pathological examinations of specimens obtained from these operations have revealed nothing of special interest.

Deformity of the loosened rib cartilage to produce the click and the accompanying pain develops secondarily, and hence may not be recognized as coming from the original injury. With this in mind, I believe a carefully taken history will, in all cases, show the original cause to be direct or indirect trauma.

DIAGNOSIS

Diagnosis of slipping rib cartilage is made from the complaint of pain, usually in the rib border, and by digital examination, with the patient relaxed and supine, with the knees flexed, in which position the abnormally movable rib cartilage, with its associated click and pain, can be demonstrated. Limitation of chest expansion as demonstrated by measurement is a suggestive diagnostic feature.¹² It is of the greatest importance in diagnosis to have in mind the possibility of this entity and a clear understanding of its development.

TREATMENT

Treatment of these cases as reported in the literature has largely consisted in excision of the rib cartilage involved, and has been followed by immediate and complete relief of symptoms.

I have treated the acute condition conservatively by adhesive strapping. Some of my patients have, in part at least, recovered with conservative treatment. Some of them have tolerated the pain and have preferred not to be operated on. The 8 patients whose symptoms have persisted and who have submitted to operation have been treated by excision of the rib cartilage or cartilages involved, which has resulted without exception in immediate and permanent cure.

Before operating on these patients, I have advised a two-day skin preparation, preceded by one or two hot-tub soaks. At operation I select a point

in the midaxillary line about three fingerbreadths above the umbilicus. With this point as a center, the incision is carried along and just above the rib border — 5 to 8 cm. Through the skin incision the operator's fingers are hooked under the rib border, and the offending cartilage is brought into the field. With the cartilage well supported by the fingers, a longitudinal incision is made through the muscles over the cartilage, exposing it. The soft tissues are pushed away, back to the junction of the rib, where the cartilage is disarticulated, and removed. It is quite brittle and may easily be broken in manipulation. This is an inconvenience and should be avoided. Careful digital examination, for abnormal mobility, is made of the adjacent cartilages. If any affected cartilage is found, it should be removed. In closure, the incised muscle is drawn in between the resected rib end and the rib above with plain catgut suture, and the end of the resected rib is buried in muscle. The skin is closed with interrupted sutures.

OPERATIVE RESULTS

Of the 16 patients with slipping rib cartilage operated on, — 8 in the literature and 8 of my own, — 8 were women and 8 were men. The ages ranged from sixteen to fifty-seven years. The condition occurred on the left in 7 cases, on the right in 8 and once bilaterally.

One rib was involved in 12 cases, two ribs in 2 cases, three ribs in 1 case and four ribs in 1 case.

In all cases there was an area of tenderness at the site of the lesion. In some cases the pain was sharp and incapacitating at times, being aggravated by twisting or bending the body, by deep inspiration or by motion of the arms. It radiated, in a different manner in each case, along the costal and sternal margins, to the back and into the abdomen. The patients frequently had a sensation of something slipping or giving way at the costal margin, coincident with a click and a pain. Some patients had the sensation of a "bunch" at the rib border, associated with pain. In a favorable position the patients were usually comfortable, but pain could be produced at any time by motion of the body or by manipulation of the loosened cartilage, so that the subjects were in constant fear of pain.

Following excision of the offending rib cartilage or cartilages, immediate and permanent cure was obtained in every case.

CASE REPORTS

CASE 1. D. C., a 20-year-old woman, was first seen at the Elliot Hospital, Manchester, New Hampshire, on March 3, 1912. She stated that she had received a direct injury to her left rib border, the result of a fall 3 months

previously, at which time she had suffered considerable pain. The chief symptom was pain in the left rib border on standing erect and on bending or twisting the body. The pain was occasional, with a slipping sensation. When lying down, the patient was comfortable.

Physical examination showed a deformity of the anterior end of the 10th left rib and cartilage.

At operation, the anterior end of the 10th left rib was found to be fractured. The anterior fragment, with its cartilage, was curled up under the costal border in such a way that it caused friction. The deformed end and the cartilage of the 10th left rib were excised. Ten days later, the patient was discharged well.

CASE 3 N. S., a 57-year-old laborer, was first seen on his admission to the Hillsborough General Hospital on May 22, 1934. The patient stated that his trouble had begun about 3 months previously, as a result of pulling on brush. He complained of pain and discomfort in the right rib border, particularly on trying to stand erect or on deep breathing.

The patient stood in a crouched position, his body bent forward and to the right. His general physical condition was good. There was localized tenderness, and a slipping sensation at the right rib border, associated with a click and manifestations of pain. This condition was diagnosed as fracture of the 8th, 9th and 10th rib cartilages, with deformity. X-ray examination of the chest was negative.

On May 26, at operation, the anterior ends of the 8th, 9th and 10th right rib cartilages were found loosened from their attachments and deformed. They were curled up under the rib borders and could be slipped back over the ribs above with a click. They were excised, and good clearance of the anterior rib ends was established.

The patient was immediately relieved. He made an uneventful recovery and was discharged on June 8.

In April, 1939, the patient reported that he had had no return of the pain in the right rib border. Examination showed the ends of the 8th, 9th and 10th right ribs to be smooth and nontender.

CASE 4 R. C., a 19-year-old bookkeeper, was first seen at my office on July 21, 1937. She stated that on June 21, when she was riding in the back seat of an automobile, the car ran into a tree and turned over. The patient was thrown to the top of the machine, and then fell to the floor. She was taken to a hospital, where examination showed "pain on pressure over the lower ribs on both sides." After 5 days she returned home, but complained of pain in the costal borders on both sides, pain in the back and limitation of abduction of the left leg.

The general physical condition was good. The patient stood in a stooped position, and walked with some difficulty. At the costal borders on both sides there was marked tenderness, and on manipulation the anterior ends of the 8th and 9th rib cartilages on both sides were found to be loosened. When these cartilages were displaced forward, a click, associated with severe pain, could be demonstrated. The patient's abdomen was symmetrical. There was marked limitation of abduction of the left leg and limitation of motion of the back.

On August 6, x-ray examination at the Elliot Hospital showed a fracture of the left pubic bone. The sternum and ribs were normal. On August 27, Dr. Ezra A. Jones applied a plaster jacket, immobilizing the pelvis and lower thorax.

While the patient wore the plaster cast, she made little complaint of pain in the rib borders, but when the cast

was removed and the back brace fitted, she had incapacitating and unendurable pain in the rib borders.

On January 4, 1938, she was admitted to the Elliot Hospital wearing a back brace. She complained of pain in the rib borders on both sides, aggravated by motion.

The patient stood in a crouched position. On digital examination of the costal borders, movable cartilages were felt, which slipped over the rib margins with a click and associated pain. She was nervous and depressed.

At operation on January 7, the 8th and 9th costal cartilages on either side were found detached at their anterior ends. The loosened ends were curled up under the rib borders. When the ends of the cartilages were manipulated, they came down over the rib borders with a click. The cartilages of the 8th and 9th ribs on both sides were excised. The following day, the patient stated that the pain in the lower ribs was gone. On January 21, she could stand erect and breathe freely, she was relieved of the old rib pain and was discharged from the hospital.

In April, 1939, the patient reported that, so far as her lower rib borders were concerned, she had no discomfort.

CASE 5 L. L., a 55-year-old teamster and woodchopper, was first seen at my office, on January 1, 1939. He stated that on December 31, 1937, while driving in a light wagon, he was run into by an automobile, and was thrown out onto the frozen ground, falling on his head and right shoulder. His shoulder was bruised, and his back was painful. On reaching home he found that he could not sit or stand erect. When he bent forward and inclined to the left, he was fairly comfortable, but when he stood erect, he felt a sharp pain at the center of his back, at about the level of the costal border, and along the left costal border. His chest and back were strapped, and he received medical treatment for 5 or 6 weeks. After 8 weeks, he returned to work but found that he could not load logs, which necessitated raising his arms high and brought his body into an extended position, causing severe pain. Two weeks later, he went to work as a chopper, and although he had some pain, he could work in a crouched position. He complained of severe pain in the back, about the level of the 12th thoracic vertebra and along the left costal border, particularly on deep breathing and when he tried to stand erect.

His general physical condition was good. Chest measurements were as follows: in repose, 37 1/4 inches, on expiration, 37 inches, and on inspiration, 38 inches. The patient stood and sat in a crouched position, with an inclination to the left. There was definite tenderness in the left lumbar region, with limitation of back motion in all directions: lateral motion to the right being most marked. The diagnosis was dislocation of the 12th left rib, or fracture of the transverse process of the 12th thoracic vertebra, and injury to the left chest.

X-ray examination of the dorsolumbar spine and lower ribs showed a moderate degree of arthritic change in the spine, but no evidence of other disease. Adhesive strapping was applied to the left chest.

On March 8, further examination showed that there was a slipping 9th left rib cartilage, which on motion caused a click and a pain.

On May 2, at the Elliot Hospital, an operation was performed. The 9th left rib cartilage was found detached from the rib above and curled up in the form of a hawk's bill, the anterior end of the cartilage resting on the inside of the rib above, so that when manipulated, the curled end of the rib cartilage came out over the rib above with a click. The deformed 9th left rib cartilage was excised. The

likelihood of nerve irritation. This probability is borne out by the fact that in every case reported, when the deformed cartilage is removed and clearance of the rib end established, the pain disappears immediately and permanently.

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THE PROLONGED USE OF ENTERIC-COATED TABLETS OF THEOBROMINE SODIUM ACETATE IN THE TREATMENT OF EDEMA AND ANGINA PECTORIS*

JOSEPH E F RISEMAN, MD,[†] AND HARRY LINENTHAL, MD[‡]

BOSTON

THE use of xanthines in the treatment of edema has decreased greatly since the introduction of mercurial diuretics. The comparative popularity of mercurials is due not only to their superior diuretic action but also to the absence of the severe gastric distress that frequently attends the use of theobromine and theophylline derivatives. The mercurial diuretics possess disadvantages, however; they must be given intravenously, intramuscularly or rectally, great care must be exercised to prevent sloughing or thrombosis, and their administration to patients with renal damage is not without danger. There are therefore many cases in which an effective oral diuretic would be of value either as an adjunct or in place of a mercurial diuretic.

Theobromine and theophylline sodium acetate have been shown to be efficient xanthines in the treatment of angina pectoris.^{1,2} All xanthines, however, cause nausea and heartburn when given in large doses.² The following case histories illustrate that these untoward gastric effects may be minimized by encasing the medication in a so-called "enteric coating," thus often permitting its prolonged use in amounts adequate to keep certain patients free from edema.

CASE REPORTS

CASE 1 N G, a 66-year-old man, with chronic suppurative pulmonary infection and frequent acute febrile episodes for over 30 years, showed fibrosis of the left lung, with traction of the mediastinum to that side. In 1923, he retired from active business. Hypertension was first noted in 1924, one year later, left nephrectomy was necessary because of renal calculi. Pathological examination of the removed kidney revealed "subacute interstitial nephritis." After 1930, he had numerous episodes of paroxysmal auricular fibrillation that were relieved by quinidine and digitalis. In 1934, the urine began to show moderately large traces of albumin and a relatively fixed specific gravity, thereafter the blood pressure ranged between 200/100 and 250/150. In 1935, a right hemiplegia was followed by almost complete recovery.

In November, 1937, peripheral edema and an enlarged tender liver were noted for the first time. The electrocardiogram showed marked left axis deviation, with notched

QRS waves in Leads I and 4 and inversion of the T waves in those leads. The nonprotein nitrogen of the blood was 44 mg per 100 cc.

Because of the renal lesion, it was inadvisable to restrict the fluid intake to less than 2000 cc. The edema failed to disappear, and the patient became drowsy and irritable. Aminophyllin (0.2 gm three times a day) and later theophylline calcium salicylate (0.26 gm three times daily) produced a satisfactory diuresis and a loss of all visible edema in 3 to 5 days. The patient became so nauseated, however, that it was necessary to discontinue the therapy, and the edema returned promptly. The administration of smaller doses was followed by the same gastric distress and a lessened diuretic effect. A commercially available enteric coated aminophyllin tablet (Byk) and also tablets of theophylline calcium salicylate coated with salol were used with the same results. Although potassium chloride was of some value, the patient could tolerate only approximately 0.5 gm a day, and the edema did not disappear entirely. Mercurin rectal suppositories were tried on two occasions but caused local irritation and little diuresis. Intravenous mercurials were avoided because of the evidence of damage in the remaining kidney.

About 8 weeks after the onset of the edema, intravenous aminophyllin (0.25 gm in 10 cc) was given every other day. Marked diuresis and loss of about 8 pounds resulted, but within 48 hours the swelling of the dependent parts regularly returned. After 3 weeks the dose had to be increased to produce diuresis, within 2 months the patient was receiving 10 gm (40 cc) of aminophyllin intravenously every other day, each dose was followed by diuresis and a loss of 3 to 5 pounds of weight, but in the course of the next 24 to 48 hours, the edema always reappeared and was associated with drowsiness and mental confusion. At no time did the intravenous xanthines cause gastric or cerebral irritation.

The effectiveness of aminophyllin intravenously suggested that if a drug of the xanthine series could be given by mouth without producing nausea, the necessity for repeated intravenous injections might be obviated. The problem was presented to several pharmaceutical houses. Several enteric coatings were prepared and tested, not only for their solubility in acid and alkaline solutions, but also for their value as a coating for theobromine sodium acetate when given to patients with angina pectoris. In March, 1938, a tablet of theobromine sodium acetate, enteric coated with cetyl alcohol, was made available and appeared to have the desired physical and chemical properties. Roentgenograms were taken after administering by mouth tablets of barium sulfate coated with cetyl alcohol. The tablets passed through the stomach intact and disintegrated in the small intestine. With catharsis or diarrhea, the tablets passed through the intestinal tract intact. From four to eight 0.5 gm tablets of theobromine sodium acetate, enteric coated in this manner, were administered to patients with angina pectoris and normal laboratory workers in

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single doses without gastric distress, and with no demonstrable weight loss or diuresis.

On the basis of these findings, the patient was given the enteric-coated tablets of theobromine sodium acetate by mouth in doses of 0.5 gm. three times daily. Four hours after the first tablet was given, diuresis began; after approximately 10 days, all visible edema had disappeared, the patient became mentally clear and less drowsy and no further intravenous medication was needed. From the onset of this medication until death 3 months later, the patient was free of visible edema, with the exception of one experimental period when the medication was stopped for a few days and the edema promptly returned. Death was due to an exacerbation of the pulmonary condition, with fever, and uremic coma.

Comment. This patient with chronic suppurative pulmonary disease, hypertension and congestive heart failure, had nephritis of the one remaining kidney. The administration of a diuretic by mouth was indicated, but the available preparations caused marked gastric distress. An enteric-coated tablet of theobromine sodium acetate was developed and tested both in the laboratory and on patients. From the time this preparation was first administered to the time of death no additional diuretic therapy was necessary.

CASE 2. Mrs. R. H., a 63-year-old woman, had a cerebrovascular accident in 1930, followed 3 months later by myocardial infarction. She recovered from both episodes and, despite the onset of auricular fibrillation in 1931, was able to carry on her household duties for over 6 years. Late in December, 1938, she was sent to the Beth Israel Hospital because of dyspnea on exertion, easy fatigability and dependent edema, all of 15 months' duration. For several weeks she had experienced attacks of paroxysmal nocturnal dyspnea, and for about 1 week had had considerable nausea and vomiting.

Physical examination showed moderate cardiac enlargement, a rough apical systolic murmur, completely irregular rhythm, a blood pressure of 210/110, a tender liver edge at the level of the umbilicus, rales at both bases of the lungs, signs of free fluid in the right chest cavity and pitting edema of moderate degree up to the knees. Laboratory data, including urine examination, blood counts and smears, blood nonprotein nitrogen, serum icterus index and blood serological tests, revealed no relevant facts. The electrocardiogram showed auricular fibrillation and depression of the ST segments in Leads 1 and 2, with partial inversion of the T waves in all leads.

During 38 days in the hospital the blood pressure fell to 160/90, and the signs and symptoms of congestive failure diminished markedly. The maintenance dose of digitalis was found to be 0.2 to 0.3 gm. daily. On the 4th day 750 cc. of fluid was removed from the right chest. Neither aminophyllin intravenously nor potassium chloride by mouth was of value as a diuretic. A mercurial diuretic (Mercupurin, 2 cc.) was administered intravenously on four occasions and by rectal suppository six times. Each treatment was followed by an increase in the urinary output from 500 to 1500 cc. and an improvement in comfort; however, pitting edema, rales and dyspnea became evident again within a few days.

Following discharge it was necessary to administer mercurial diuretics intravenously every 5 to 7 days. Late in March, 1939, enteric-coated theobromine sodium acetate therapy was begun (0.5 gm. four times daily). For the next 4 weeks no additional diuretics were necessary, and the patient remained free of edema. Her family physician then discontinued the xanthine therapy and resorted to

intravenous diuretics, but the signs and symptoms of congestive failure returned. When enteric-coated tablets of theobromine sodium acetate were again administered, intravenous mercurials became necessary only about once in 4 or 5 weeks. Three months later the patient died, a few days after another cerebrovascular accident.

Comment. This patient with arteriosclerotic heart disease, auricular fibrillation and congestive failure required intravenous mercurial diuretics every 6 to 7 days. Following the administration of enteric-coated tablets of theobromine sodium acetate, the intravenous therapy was unnecessary for weeks at a time. Cessation of the xanthine therapy resulted in reappearance of the signs and symptoms of congestive failure, only to be favorably affected by readministration of the drug.

CASE 3. N. B., a 51-year-old tailor with mild diabetes mellitus, had suffered from attacks of substernal and cordial pain that occurred on the slightest exertion, emotion from two to eight times daily and usually "2 minutes." These attacks were relieved by rest, nitroglycerin and were more frequent during the winter. He had been confined to bed for several weeks on occasions because of prolonged attacks.

Examination showed a short, stocky and exceedingly apprehensive man. There were peripheral and arteriosclerosis and pulmonary emphysema; the blood pressure was 130/85. An electrocardiogram and a 7-foot plate of the heart were normal.

When first seen in the clinic on November 4, 1938, the patient was receiving digitalis and was complaining of constant oppression, relieved slightly by nitroglycerin. Digitalis was omitted after 1 month of observation; the constant pain disappeared, but he experienced four to eight attacks daily. During the course of the next 16 months, different medicinal therapeutic measures were used, but none were effective except theobromine sodium acetate (0.5 gm.) and quinidine sulfate (0.3 gm.), which resulted in moderate improvement clinically (one to three attacks a day) and a slight increase in exercise tolerance, as measured under standardized conditions. On May 4, 1939, enteric-coated theobromine sodium acetate (1.0 gm. four times daily) was prescribed, with an additional dose (0.5 gm.) of the uncoated medication in the morning. On this regime the patient could walk farther, and the attacks were less numerous (two to three a week); the exercise tolerance increased. Each time tablets of lactose or sodium bicarbonate of similar appearance were administered, he experienced eight to ten attacks daily, and his exercise tolerance decreased. Each time 1 gm. of theobromine sodium acetate was administered, four times daily, definite improvement resulted. Larger doses (2 gm. four times daily) resulted in nausea and diarrhea and made it necessary to decrease the dosage of the drug.

Advantages of Xanthine Therapy

These cases illustrate the effectiveness of diuretics given orally in treating cardiac or renal edema. This concept is not novel, but the method has not been of maximum practical value because of the frequency of nausea and heartburn following their ingestion in adequate doses. During the last two years several effective enteric-coated preparations of theobromine and theophylline sodium acetate have become available commercially, and it is no longer necessary to rely on chemical houses

for a special supply of these drugs. In our experience the enteric coated theobromine sodium acetate marketed by Brewer and Company, Incorporated, and by E. R. Squibb and Sons and the theophylline sodium acetate marketed by the Upjohn Company, although covered with different enteric coatings, are effective diuretics that can be given by mouth in adequate dosage (one tablet four times daily) over long periods without gastric distress. We have found them of value in cardiac edema both with and without valvular damage or abnormal rhythm, and irrespective of whether the heart disease is of rheumatic, hypertensive or arteriosclerotic origin. We have had no experience with their use in syphilitic heart disease or cor pulmonale. Their greatest value has been in patients who required frequently repeated intravenous injections of mercurial diuretics. In such cases intravenous therapy was frequently unnecessary. Not all patients respond to this therapy, but the advantages of administering the xanthines by mouth make a trial advisable.

Disadvantages of Xanthine Therapy

The enteric-coated tablets are not so effective as the intravenous mercurials for the removal of accumulations of large amounts of edema fluid. Doses of 2 to 3 gm. of theobromine sodium acetate have been administered four times daily for two or three days to several patients with marked edema. Although these doses were usually well tolerated, the diuretic response was not satisfactory, and the intravenous mercurials had to be invoked to eliminate the residual edema.

It has been suggested that the gastric distress which may follow the use of the xanthines is due mainly to a central rather than a local action. This does not seem to be true, for patients who cannot tolerate small doses of the uncoated drug by mouth may take large doses of the enteric coated tablets orally without distress and with excellent therapeutic response; furthermore, large doses of aminophyllin can be given intravenously without gastric distress (Case 1).

The possibility of cerebral stimulation following the prolonged use of the xanthines has been another objection to their use. The close chemical relation of theobromine and theophylline to caffeine is probably responsible for this concept. We have administered 0.5 gm. of the enteric-coated theobromine sodium acetate 4 times a day for months to more than 100 patients with angina pectoris without observing a single case of nervousness, irritability or sleeplessness or any other evidence of cerebral irritation or stimulation.

Use in Angina Pectoris

Not all patients with angina pectoris respond to the sodium acetate derivatives of theobromine or theophylline, but it is apparent that they are of value in approximately half the cases. That the effect of the medication is not entirely psychological is shown by the increased amount of work that patients can do after the administration of the drug, and also by the fact that these drugs prevent the electrocardiographic changes that would otherwise occur during exertion.³

Adequate dosage is of the utmost importance. Unless the purines are given frequently in sufficiently large amounts and over long periods, the optimum therapeutic results will not be obtained. It has been found that the optimum dosage is usually the maximum amount that can be administered without inducing nausea.² The dose that has been found to be satisfactory for most patients was 0.5 gm. of theobromine sodium acetate or 0.2 gm. of theophylline sodium acetate given four times daily—before meals and before retiring. Most patients fail to derive benefit from smaller amounts. An occasional patient who does not respond to the usual dose may derive benefit from two or even three times this dose (Case 3). Some patients find the tablet of theobromine sodium acetate too large to swallow with ease, and a few experience slight gastric distress despite the enteric coating. In such cases it is advisable to give the medication more frequently but in smaller amounts (0.25 gm. five or six times daily).

The enteric coating delays absorption for four to six hours. It is obvious, therefore, that it is the medication taken before retiring that is effective in the early morning, and that a dose taken on arising may be of no value in preventing attacks of angina pectoris during the forenoon. Some patients continue to have pain during the morning despite this late evening dose. In such cases the administration of 0.25 or 0.5 gm. of uncoated theobromine sodium acetate on arising, in addition to the coated tablet, is of value. If the patient is free of pain during sleep, the dose after supper may be omitted.

So far as we know, the medication must be continued indefinitely in most cases, and any interruption of medication will usually be followed by a return of symptoms within a few weeks. An occasional patient, however, may be free from pain for several months after taking the medication for a few weeks. There is little evidence of development of a tolerance to the drug. Occasionally the use of the medication is followed by a period of freedom from pain, with later reappearance of discomfort despite continuation of medication. In

some cases, evidence of progression of the disease may be found, such as electrocardiographic changes and increased sedimentation rate.

Use in Other Cardiac Conditions

The success achieved with the use of theobromine sodium acetate in angina pectoris and edema has led us to employ the drug in other conditions, especially arteriosclerotic heart disease and hypertension, for according to recent investigations,³ the drug causes coronary dilatation, and therefore better myocardial nutrition. We have never observed any appreciable lowering of the blood pressure following this medication. Some patients with cardiac asthma, however, appeared to have less frequent attacks following administration of the drug.

CONCLUSIONS

Enteric-coated tablets of theobromine sodium acetate and theophylline sodium acetate are now available, which make it possible to give therapeutically adequate doses of these drugs over long

periods. By this means, the necessity of intravenous administration of diuretics may be obviated or decreased in certain patients with heart disease or nephritis, and the frequency and severity of attacks of angina pectoris may be diminished. When the drugs have been given continuously for a long time, no untoward effects have been observed except for occasional slight gastric discomfort. The optimum dosage for most patients appears to be 0.5 gm. of enteric-coated theobromine sodium acetate, or 0.2 gm. of enteric-coated theophylline sodium acetate, given four times daily, before meals and before retiring. Adequate dosage is necessary; in angina pectoris it is especially important to administer a dose of the medication before retiring.

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REFERENCES

1. Riseman, J. E. F. and Brown, M. G. Medicinal treatment of angina pectoris. *Arch. Int. Med.* 60:100-118, 1937.
2. Brown, M. G. and Riseman, J. E. F. The comparative value of purine derivatives in the treatment of angina pectoris. *J. A. M. A.* 109:256-258, 1937.
3. Freedberg, A. S., Riseman, J. E. F. and Spiegel, I. D. Objective evidence of efficacy of medicinal therapy in angina pectoris. *Am. Heart J.* (in press).

DIAPHRAGMATIC ABNORMALITIES SECONDARY TO TUMORS*

A Roentgenologic Study

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THE exact status of the diaphragm in non-neoplastic diseases is often difficult to determine from the clinical findings alone. In recent years, various x-ray diagnostic procedures have provided helpful supplementary evidence. Since the symptoms produced by most diaphragmatic abnormalities are difficult to interpret, it is not surprising that these conditions may be easily overlooked among patients with malignant tumors and that, consequently, many complaints are dismissed on the basis of probable visceral metastases or the patient's poor general condition. Thorough investigation both by x-ray films and fluoroscopy is essential for the recognition of most diaphragmatic disorders. Thus it seems highly desirable to direct more attention to patients with tumors who present symptoms referable to the diaphragm.

In recent reviews and reports of primary diaphragmatic tumors,¹⁻³ malignant neoplasms are about twice as common as benign ones. Much more frequently, the diaphragm is secondarily in-

involved by metastases or by direct extension of a cancer primarily situated in the breast, lung, stomach or more remote organs. Most cases of secondary neoplastic invasion of the muscular structure of the diaphragm produce no striking symptoms, and attention is usually drawn to the site of the primary or of the skeletal and visceral metastases.

Moreover, changes in and adjacent to the diaphragm are not infrequent in patients with neoplastic disease — in addition to the primary and secondary diaphragmatic neoplasms mentioned above. Three separate entities seem worthy of further attention and are exemplified by the accompanying case reports.

SUBPHRENIC ABSCESS

Perforation of a tumor of the colon has been listed by Graham⁴ as an occasional cause of left subphrenic abscess, the more frequent causes being perforated peptic ulcer, post-partum infection, and the other conditions that produce a peritonitis. Although subphrenic abscesses are only 20 to

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25 per cent as common on the left as on the right in the average surgical practice,⁵ among tumor patients the opposite distribution seems to hold, with neoplastic perforation as the most frequent cause. The stomach seems fully as important a site for neoplastic perforation as the colon.

It has often been found that the appearance of an unexplained pleural effusion, with pleural thickening and suppurative pneumonitis, may provide a helpful clue to possible subphrenic disease. Pleural and pneumonic complications from subphrenic

may also lessen the severity of the process by simulating the effect of drainage. It seems evident that the neoplasms that are well differentiated and show less frequent ulceration are the least likely to result in perforation. Among the tumors that increase the probability of this occurrence, the lymphoma group must be included.

CASE 1. A 48-year-old undertaker entered with complaints of tiredness and abdominal pains for the previous 6 months. The pain was described as sharp epigastric discomfort with radiation to the left costal margin. A Sippy diet had been tried, with the result that the character of the pain changed only from sharp to dull. There had been a weight loss of 76 pounds. A productive cough had been present for 4 weeks.

A roentgenogram of the thorax (Fig. 1) revealed marked left basilar pleuritis and evidence of fluid accumulation. Barium examination of the upper gastrointestinal tract revealed a very large ulcer crater involving the proximal portion of the greater curvature of the stomach (Fig. 2). The barium flowed readily from the



FIGURE 1. Case 1.

A routine chest film showing left basilar effusion and pneumonitis.



FIGURE 2. Case 1.

A film showing an irregular carcinomatous ulcer of the proximal greater curvature of the stomach, with escape of barium into a subphrenic abscess.

intraperitoneal abscess, which occur in 22 to 50 per cent,^{6,7} and from extraperitoneal subphrenic suppuration of perirenal origin, which occur in 16.5 per cent,⁸ have been explained by the richness of the lymphatic supply, including extensive transphrenic communications. With fluoroscopic evidence of fixation of the affected dome of the diaphragm and the opportunity to visualize the barium-filled cardia of the stomach, early detection of subphrenic abscess is more certain. As compared with the same condition in patients without cancer, a contrast exists in the usually less severe illness seen in subphrenic abscesses that follow the slow perforation of a tumor, for the neoplastic tissue often contributes to the walling-off process. Maintenance of communication of the abscess cavity and a hollow viscus through the perforation,

depth of the ulcer crater into a large subphrenic abscess cavity. After a few weeks of supportive treatment the patient expired as a result of a carcinomatosis.

Comment. This case presented a characteristic clinical picture of ulcerating carcinomatous involvement of the proximal greater curvature. The passage of barium from the stomach into the abscess cavity added convincing evidence of the mechanism involved in arriving at the end result of basilar pleuritis, effusion and pneumonitis.

PHRENIC PARALYSIS

The reported causes of spontaneous phrenic paralysis are numerous, including compression by new growths and other masses, syphilis, diphtheria, scarlet fever, infantile paralysis, ascending paralysis and extensive mediastinal, basilar or generalized pleuritis.⁹ However, this complication is relatively infrequent among patients in a general hospital. On the other hand, among tumor patients neoplastic phrenic paralysis is more frequent than all other causes combined. The variation in the level of the diaphragmatic domes in normal persons is so great that by x-ray evidence alone the condition may remain unrecognized unless fluoroscopic observation for paradoxical excursion is conducted.

The presence of phrenic-nerve invasion by neoplastic tissue is observed with or without other intrathoracic disease; thus, from a carcinoma of the breast, or any other cancer causing extensive neoplastic lower cervical and medial supraclavicular nodes, one may see phrenic interruption, even in the absence of pulmonary or mediastinal metastases. Occasionally both the phrenic and recurrent laryngeal nerves are invaded, with paralysis of the vocal cord and the dome of the diaphragm on the same side as the mass of palpable medial supraclavicular and cervical nodes. Occasionally the phrenic nerve is invaded as it passes through the superior mediastinum,¹⁰ or along the middle mediastinum anterior to the hilar structures on each side or more distally between the pleura and pericardium. Thus it seems worth while to investigate any unexplained elevation of a diaphragmatic dome in a patient with cancer of the lung. One may assume that paralysis, if present, proves that a primary lung tumor has advanced beyond successful treatment by pneumonectomy, even though film evidence of such spread is lacking.

The return of function that occurs in cranial and other nerves after regression of the neoplasm from radiation therapy¹¹ also follows palliative application of x-ray for phrenic palsy. Frequently the dyspnea is quite distressing, even in the absence of any pulmonary involvement. It is surprising that return of motor function can occur in only a few weeks following radiation therapy. A recent case of sudden complete paralysis of the right sixth cranial nerve in a patient with widespread Hodgkin's disease disappeared in sixteen days after the first x-ray treatment. This was interpreted as indicating a compression of medullated fibers by neoplastic cells, rather than a complete division of such fibers by the neoplasm.

CASE 2. A 34-year-old paper-mill employee was admitted with complaints of dyspnea, cough, fatigue and weight loss of 8 months' duration. Examination, which included

x-ray studies and bronchoscopy, revealed a carcinoma simplex of bronchiogenic origin in the right lower lobe. A moderate elevation of the right dome of the diaphragm observed in the films (Fig. 3) was found on fluoroscopic study to be the result of complete phrenic-nerve paralysis. Hilar, mediastinal and supraclavicular nodes were enlarged. Palliative x-ray therapy caused regression of the thoracic disease, but there was a rapid decline in the patient's general condition, with terminal jaundice. At the last admission 3 months later, the icterus index was 90, and the serum van den Bergh revealed 10 mg. of bilirubin per 100 cc., direct reaction.

Post-mortem examination showed invasion of the right phrenic nerve from the medial right supraclavicular

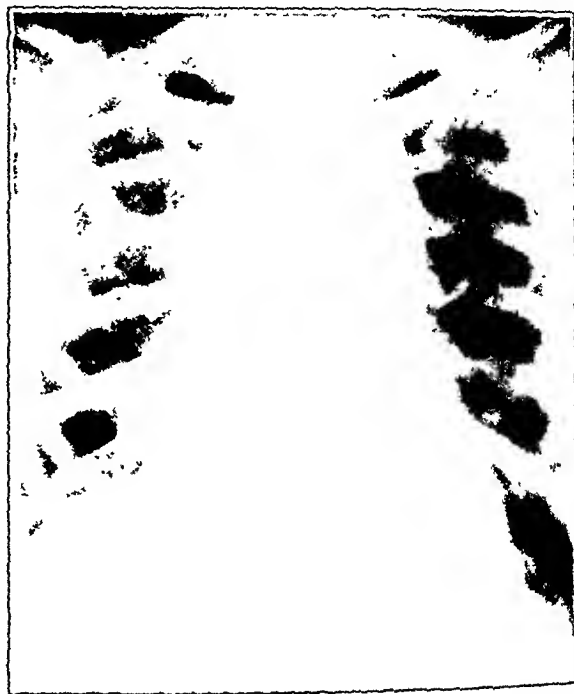


FIGURE 3. Case 2.

A film showing elevation of the right dome of diaphragm from paralysis, intrathoracic changes from a carcinoma of the right lower lobe and metastases to the right hilus and mediastinum.

metastatic adenopathy. Pancreatic metastases caused obstruction to the bile duct. Metastases to the heart, duodenum, mesentery of small bowel, adrenal glands, kidneys, cerebrum, and cervical, mediastinal, abdominal and pelvic lymph nodes were observed.

Comment. In this case there was obvious post-mortem evidence of phrenic-nerve invasion. The site of invasion was in the medial supraclavicular region, rather than at a more distal level. Thus the absence of a pulmonary lesion, as in cancer of the breast, does not exclude the possibility of phrenic palsy. In fact, phrenic-nerve invasion by neoplastic tissue seems more frequent at the level of the medial supraclavicular lymph nodes than any other section. Although treatment did not accomplish regression with return of function, such an occurrence has been observed in other cases.

HIATUS HERNIA

As an occasional complication of large tumor masses or large accumulations of fluid within the abdomen, the formation of an epiphrenic gastric pouch by hiatus herniation deserves mention. Dur-

ing recent years symptoms referable to small gastric pouches above the diaphragm have received considerable attention and careful study. Evans and Bouslog¹ have reported its occurrence in pregnancy as a cause of pyrosis. Reid¹² has reported simulation of cardiac infarction by hiatus herniation, and a peptic ulcer in the lower esophagus may occasionally be traceable to hiatus herniation with regurgitation, according to Chamberlin.³

CASE 3 A 56-year old housewife entered the hospital complaining of abdominal discomfort of about 30 months duration. Originally these symptoms were very slight. An x-ray investigation at another hospital shortly after onset of the disturbance had demonstrated a oval 4 cm tumor, with persistent deformity of the greater curvature of the stomach near the junction of its middle and distal thirds. The symptoms were so slight that operation was declined.

When first seen at the Cancer Section of the West



FIGURE 4 Case 3

A film showing deformity and elongation of the stomach from fixation to a mass—a retroperitoneal hemangioendothelioma—along the greater curvature

field State Sanatorium, the patient had experienced persistence of symptoms. In addition substernal pain frequently occurred, especially when she was in the recumbent position. Physical examination revealed a large irregular mass extending down to the umbilicus. Cichexia, ascites and edema of the lower extremities were observed. X-ray studies revealed fixation of almost all the greater curvature to a very large mass (Fig 4). This mass was found to be separate from the liver and spleen. The adjacent gastric rugae were normal, that is, there was no fluoroscopic or film evidence that the tumor had involved the mucosa. The transverse colon and adjacent flexures were displaced downward and anteriorly (Fig 5). Ex-

ploratory pyelograms showed no urinary tract abnormality. Six months elapsed before the patient would consider hospitalization, although laparotomy was advised from the first.

Exploratory laparotomy revealed a large irregular cystic tumor about 18 by 22 by 10 cm. The main tumor mass arose in the region of the pancreas and projected into the lesser peritoneal sac. The mass was attached to structures about it distally to 3 cm below the level of the umbilicus and proximally to the liver and stomach.

Histologically the tissue was found to be typical of



FIGURE 5 Case 3

A film made during fluoroscopy to show the epiphrenic gastric pouch that resulted from hiatus herniation

hemangioendothelioma both by frozen and paraffin sections.

Comment The occurrence of a large cystic tumor and ascitic fluid in this case simulated the abdominal enlargement of late pregnancy. The hiatus hernia may be assumed to have been related to the consequent increased intraabdominal pressure. This assumption is verified by the lack of any such finding at the onset of symptoms, when an upper gastrointestinal examination was done prior to the time the tumor reached its final large size or ascites appeared. The frequency of abdominal enlargement from neoplastic disease, particularly ovarian tumors affords this type of increased intraabdominal pressure which may assert itself by herniation of the stomach through the esophageal hiatus.

CONCLUSIONS

More careful clinical and roentgenologic attention to the diaphragm in patients with neoplastic disease is advocated.

Lack of pathognomonic physical signs of subphrenic abscess, neoplastic phrenic paralysis and hiatus herniation in these patients calls for thorough investigation of symptoms referable to the diaphragm and adjacent structures.

Fluoroscopy, films during and after fluoroscopy and fluoroscopic visualization of the barium-filled cardia are of established value and in fact are often essential for the diagnosis of these complications.

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REFERENCES

- 1 Peery, T. M. and Smith, W. A. Rhabdomyosarcoma: a case report *Am J. Cancer* 35:416-421, 1939
- 2 Ryan, E. J. Rhabdomyosarcoma of diaphragm. *Cleveland Clin Quart* 6:304-306 1939

3. Ballou, H. C. and Spector, L. Lipoma of the diaphragm *Canad M A. J.* 41:487-489, 1939.
4. Graham, E. A. *Surgical Diagnoses* Vol III. 1044 pp Philadelphia W. B. Saunders Co., 1930. P. 358
5. Carter, B. N. Left subphrenic abscess *Ann. Surg.* 110:562-577, 1939
6. Ochsner, A. and Graves, A. M. Subphrenic abscess *Ann Surg* 98:861-990, 1933.
7. Wellman, J. M. and Maddock, W. G.: cited by Nesbit and Dick⁸
8. Nesbit, R. M. and Dick, V. S. Pulmonary complications of acute renal and perirenal suppuration. *Am. J. Roentgenol.* 44:161-169, 1940
9. d'Angelo, F. and Chiodi, S. Osservazioni e considerazioni sulla paralisi spontanea del diaframma. *Ann. Ist. Carlo Forlanini* 3:385-404, 1939
10. Turner, J. W. and Jaffe, H. L. Metastatic neoplasms: a clinical and roentgenological study of involvement of skeleton and lungs *Am J Roentgenol.* 43:479-492, 1940.
11. Martin, C. L. Complications produced by malignant tumors of nasopharynx. *Am J. Roentgenol.* 41:377-390, 1939.
12. Evans, J. R. and Bouslog, J. S. Intractable heartburn of pregnancy *Radiology* 34:530-535, 1940.
13. Reid, W. D. Hiatus hernia simulating cardiac infarction. *New Eng J. Med.* 223:50-52, 1940.
14. Chamberlin, D. T. Peptic ulcer of the esophagus *Am. J. Digest Dis & Nutrition* 5:725-730, 1938

CLINICAL NOTE

EMERGENCY TREATMENT OF TRAUMATIC EMPHYSEMA OF THE MEDIASTINUM

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A STUDY of the literature on traumatic emphysema of the mediastinum confirms the statement of Heuer¹ that "procedures directed to the mediastinum itself, with the idea of allowing the escape of air or to close the lesion from which the air is escaping, have not been numerous in the literature." He quotes Gatellier and Barbary² as reporting that 2 of their 3 patients died because lateral incisions under the clavicle did not permit satisfactory escape of the air. The third patient recovered following incision at the base of the neck, with separation of the pretracheal and peritracheal tissues. Heuer also states that Phocas and Apert³ performed artificial pneumothorax in some cases, with eventual recoveries.

The effect of air in the mediastinum is not always serious. Fortunately, in the greatest number of cases the symptoms are mild, and Nature takes care of them with no help from the surgeon. In a few cases, however, the effects are very serious. Concerning these, Heuer¹ states: "The heart, great vessels and trachea may be compressed or dislocated, giving rise to urgent symptoms. These are marked agitation and anxiety, cyanosis, tachy-

cardia, signs of suffocation, tumefaction of the base of the neck and a rapidly spreading emphysema." In such urgent cases the surgeon has to work fast to save the patient.

Babcock⁴ states that emphysema of the mediastinum may seriously upset respiration and circulation, but that subcutaneous emphysema usually disappears spontaneously in a few days. Warbasse and Smyth⁵ believe that emphysema occurring in connection with such wounds of the pleura usually requires no treatment; in most cases the air is absorbed, and if it should give distress, it may be liberated by incisions of the skin. DaCosta⁶ makes a similar statement: "Emphysema usually disappears, but if it does not, make many small incisions and employ pressure." Eliason⁷ admits that injury to the pleura and lung producing mediastinal emphysema may be the cause of death, but states that emphysema from this cause usually requires no treatment, disappearing in about ten days. Hertzer and Chesky⁸ also found that emphysema in the tissues is soon absorbed. Watkins⁹ and Stenbuck¹⁰ follow the opinion of the preceding men and agree that if left alone the air will be absorbed naturally without the aid of a suprasternal-notch incision; if active measures are contemplated, both recommend artificial pneumothorax as the method of choice. On the other hand, suprasternal-notch incision with applications of a suction cup, according to Lenormant,¹¹ is necessary in most cases.

All cases of emphysema of the mediastinum do not fall into the hands of surgeons of wide experience, and are not treated in large metropolitan hospitals. What if a serious case falls into the hands of a surgeon who has never seen one like it? It surely is too late to start looking for literature on the subject, since cases are extremely rare and, hence, difficult to find. He can only go

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ahead immediately and do those things that, according to his senses, seem to be called for

The following case is reported, not to present a masterpiece in chest surgery but to be of service, if possible, to someone who might be called on to save a patient's life under similar circumstances

CASE REPORT

A 63-year-old man fell off a scaffold and landed on his right thoracic region. One of us (D M C.) removed the patient to the hospital immediately.

Examination revealed a massive accumulation of subcutaneous air extending over the upper thorax, supraclavicular region, face and upper extremities. Perspiration was profuse. The temperature was 99°F, the pulse 100, the respirations 40, and the blood pressure 220/110. The chest was very tender over the right posterior thoracic region and right shoulder, and crepitus was present. The heart was slightly enlarged, but the sounds were of fair quality. Abdominal examination was negative. It was thought that there were probably fractures of the right ribs, with puncture of the pleura and lung.

The examination was not prolonged, since the patient's condition was growing rapidly worse. Because the nearest chest surgeon was eighty miles away, it was decided to administer the best treatment possible under the circumstances.

Following a sterile preparation of the neck a vertical transverse incision was made, under local anesthesia in the suprasternal notch. The subcutaneous tissues were separated by blunt dissection. Air bubbled through the wound after the subcutaneous fascia had been divided. By means of an inverted sterile glass funnel and rubber tube attached to an electric pump, suction was secured. Considerable relief was obtained at once, and the patient's color improved. Suction was stopped after several minutes, and the patient's condition grew worse again very rapidly. Suction was reapplied, and an artificial pneumothorax apparatus, located six miles away, was sent for. With this apparatus, about 1300 cc of air was introduced into the right pleural space to collapse the lung. Suction was removed, and the patient's condition remained improved. Owing to the emphysema, no attempt was made to correct the condition of the ribs, and the patient was removed to his room at 8:00 a.m.

During the next 24 hours, suction was applied three times to relieve emphysema and discomfort. The respira-

tory rate dropped to 28, and the pulse to 96, the blood pressure rose to 145/100.

The following day the patient's condition had improved, and about half the subcutaneous emphysema had disappeared. Dyspnea was scarcely noticeable. The temperature was 100°F, the respirations 28, the pulse 88, and the blood pressure 150/88.

An x-ray film of the chest showed a complete collapse of the right lung, with displacement of the heart to the left, and three separate fractures, posteriorly, of the 3rd rib on the right side, with considerable displacement of a large posterior fragment. It also showed fractures of the 6th and 2nd ribs near the spine, with displacement.

From then on the patient showed steady improvement, the temperature, pulse and respirations dropping to normal on the 7th day. The right thoracic region was strapped with adhesive tape on that day. This might have been done before, but owing to the extensive emphysema, would have been relatively ineffective. The patient was discharged on the 9th day, free from pain and with the emphysema nearly gone. He was seen several months later, perfectly well and back at work, he did not complain of discomfort.

SUMMARY

The successful emergency treatment of a patient with traumatic emphysema of the mediastinum is described.

REFERENCES

1. Heuer, G. J. *Surgery of the Thorax*. Nelson New Loos Leaf Surgery, Vol. 4. New York: Thomas Nelson & Sons, 1937. Pp. 357-588.
2. Gagliardi and Barbry. La mortalité dans les plaies pénétrantes de poitrine par projectiles de guerre. Ses causes les plus fréquentes. Traitement appliqué dans une ambulance chirurgicale de première ligne. *Bull et mem Soc de chir de Paris* 43:509-519, 1917.
3. Phocas and Apert. Perforation du thorax par celat d'olus emphyseme du cou et du mediastin. *Bull et mem Soc med d'hop de Paris* 39:834-837, 1915.
4. Babcock, W. W. *A Textbook of Surgery for Students and Physicians*. Second edition. 1312 pp. Philadelphia: W. B. Saunders Co. 1935. P. 874.
5. Warshaw, J. P. and Smyth, C. M. Jr. *Surgical Treatment & practical treatment of the therapy of surgical diseases*. Second edition. Vol. 1. 903 pp. Vol. 11. 782 pp. Philadelphia: W. B. Saunders Co. 1937. Vol. 1. pp. 484-778. Vol. 11. p. 380.
6. Dr. Costa, J. G. *Modern Surgery. General and operative*. Tenth edition. 1404 pp. Philadelphia: W. B. Saunders Co. 1931. P. 454.
7. Eliason, E. L. *Fractures*. Nelson New Loos Leaf Surgery, Vol. 3. New York: Thomas Nelson & Sons, 1937. Pp. 245-404.
8. Hentzler, A. E. and Cheiky, V. F. *Surgery of a General Practice*. 612 pp. St. Louis: C. V. Mosby Co. 1934. P. 215.
9. Watkins, A. G. cited by Graham, E. A. *The 1937 Year Book of General Surgery*. 827 pp. Chicago: Year Book Publishers, 1937. P. 219.
10. Steinbock, J. B. cited by Graham, E. A. P. 221.
11. Lennormant, G. *Poitrine (plaies)*. *Pratique medico chirurgicale*. Third edition. Vol. 8. 1162 pp. Paris: Masson et Cie. 1931. Pp. 21-32.

MEDICAL PROGRESS

CARDIOVASCULAR DISORDERS IN SCARLET FEVER*

CONRAD WESSELHOEFT, M.D.†

BOSTON

MEDICAL progress in scarlet fever has not been confined to the fields of bacteriology, immunology and chemotherapy. The cardiovascular disorders that arise in this disease have been the subject of numerous investigations, which are worthy of review.

MAJOR CLINICAL FINDINGS

The vascular disturbances of the eruptive stage of scarlet fever consist in dilatation of the periph-

ease itself is brought about by the action of the toxin on the peripheral capillaries. With this in mind, one might expect that the heart as a highly specialized organ of this vascular system would be susceptible to attack by this toxin. As a matter of fact, the heart is under certain circumstances peculiarly susceptible to the toxic products of the scarlet-fever strains of streptococci, but this susceptibility in the vast majority of cases leads to no more harm than the rash itself.

TABLE 1. *Reported Incidence of Endocarditis and Pericarditis in the Course of Scarlet Fever, Compiled from Metropolitan Asylums Board Reports, London**

YEAR	CASES OF SCARLET FEVER	CASES OF ENDOCARDITIS	INCIDENCE OF ENDOCARDITIS %	CASES OF PERICARDITIS	INCIDENCE OF PERICARDITIS %
1907	22,096	129	0.58	17	0.05
1908	20,102	165	0.82	24	0.12
1909	16,191	118	0.73	11	0.07
1910	9523	88	0.92	12	0.14
1911	8438	63	0.75	14	0.17
1912	9793	31	0.32	3	0.03
1913	14,325	79	0.55	13	0.09
1914	21,006	87	0.41	17	0.08
Totals	121,474	760	0.63	111	0.09

*Now the County Council Hospitals, no published reports since 1914

On the other hand, serious cardiovascular disorders may occur in the wake of scarlet fever; but the results of investigations indicate that these serious disorders are relatively infrequent as compared to those following rheumatic fever and chorea. Indeed, many—if not most—valvular defects found in the course of scarlet fever can be traced back with careful histories to a previous rheumatic or choreic infection.

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The endocarditis that does originate from the hemolytic streptococcus of scarlet fever is a result of blood-stream infection and constitutes a bacterial endocarditis. Furthermore, in scarlet fever such blood-stream infection is apt to follow a local pyogenic process in the mastoid cells, associated with a lateral sinus thrombosis. But even with a blood-stream infection, such an endocarditis takes

TABLE 2. *Reported Incidence of Endocarditis in Scarlet Fever.*

	SERIES COMPLETED	CASES OF SCARLET FEVER	CASES OF ENDOCARDITIS	INCIDENCE OF ENDOCARDITIS %
Metropolitan Asylums Board, London	1914	121,474	760	0.63
Joe ¹ City Hospital, Edinburgh	1924	24,102	61*	0.25
McCollom, Place and Funk, ² Boston City Hospital	1925	2000	13	0.65
Zischinsky, ³ Wilhelminen Spital, Vienna	1930	20,000	11	0.05
Gordon, ⁴ Herman Kiefer Hospital, Detroit	1931	10,666	78	0.7
Imrie, ⁵ Belvidere Fever Hospital, Glasgow	1933	1616	6†	0.37
Wesselhoeft, Haynes Memorial Hospital, Boston	1939	12,820	58‡	0.45
Totals	...	192,678	987	(0.51)

*This figure includes pericarditis with endocarditis

†All 6 had a rheumatic history and 2 had valvular lesions on admission

‡Thirteen of these patients were known to have had valvular disease before scarlet fever, in 12 cases there is doubt whether the valvular disease preceded the scarlet fever

cussion of cardiovascular disorders arising in the course of scarlet fever should begin with the paramount fact that the chief characteristic of the dis-

place very rarely. In fact, its infrequency in cases of bacteremia suggests that a previously damaged valve may be necessary. The commoner form of endocarditis seen in scarlet fever is of rheumatic origin.

Clinical interest in endocarditis during scarlet

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fever, therefore, resolves itself into a recital of its reported incidence. The accompanying tables give the incidence of both the bacterial and rheumatic types. Probably these include a certain number of unrecognized congenital defects. I am sure that this is true of my own earlier records. In Table 1, I have compiled the figures from 1907 to 1914 from the annual reports of the Metropolitan Asylums Board hospitals of London. Others have used the figures of isolated years, but this compilation shows the variation of incidence and its independence of the morbidity, as well as the relation of endocarditis to pericarditis. Table 2 is a compilation of published figures, including the extraordinarily low figure of Zischinsky³ and the data regarding rheumatic history in Imrie's⁵ series. My figures from the Haynes Memorial Hospital, like some of the others offered in Table 2, do not represent my consistent effort to ascertain a previous rheumatic history. Because of this review, subsequent cases are being carefully studied on this point, with the result that the findings more closely approximate those of Imrie. The total average in this substantial number of hospital cases is 0.51 per cent.

If one excludes those cases that have all the characteristics of rheumatic fever, the incidence of what may be termed a true scarlet fever endocarditis with vegetations and permanent damage becomes exceedingly rare. Zischinsky³ found only one such case among 20,000 cases of scarlet fever in the Wilhelminen Spital in Vienna. He states that he agrees with his predecessors, Pospischill and Weiss, that scarlet fever plays no significant part in the etiology of valvular disease.

The relation of scarlet fever to rheumatic fever is a subject that has brought forth many theories. Both diseases are intimately related to the streptococcus, and rarely originate in tropical climates. In both, allergic hypotheses have been advanced to explain the symptoms⁶⁻⁸. The close clinical and immunologic relation of the hemolytic streptococcus to rheumatic fever has been brought out by Mote and Jones⁹.

In scarlet fever, there is uncontroverted evidence that the erythrogenic toxin is the product of certain strains of hemolytic streptococci, although there are those who continue to believe that a virus is in some way likewise responsible. In rheumatic fever, a nonhemolytic streptococcus is incriminated in much the same way as streptococci in scarlet fever before the discovery of the Dick. Only recently evidence has been presented in support of the hypothesis that a virus is associated with the streptococcus in rheumatic fever^{10, 11}. It is generally conceded that the streptococcus, often in the form of a tonsillar infection, predisposes the

tissues to a latent rheumatic fever infection. If this hypothesis is correct, an infection with scarlet fever might likewise activate any latent rheumatic fever element, and there is ample clinical evidence that it does so.^{1, 12}

If an endocarditis develops from two to twelve months after a tonsillitis, it is promptly diagnosed as rheumatic heart disease, but if endocarditis develops in the same length of time after scarlet fever it is oftener diagnosed as a missed scarlet-fever heart lesion. Such a diagnosis is not in keeping with present day knowledge of scarlet fever and rheumatic fever. An established valvular defect coming into existence late after scarlet fever should be considered of rheumatic origin.

In connection with the rheumatic origin of endocarditis in the course of scarlet fever, it should be kept in mind that scarlet fever is a disease largely of early childhood, and therefore many potential rheumatic patients come down with scarlet fever before their first attack of rheumatic fever. Furthermore, older patients are less likely to develop valvular disease than children in the course of rheumatic fever attacks¹⁴. Consequently, these two factors reduce the chances of developing rheumatic endocarditis in the course of scarlet fever. Of course, if the valves are already damaged by a previous attack of rheumatic fever, the endocarditis cannot be said to have originated with the scarlet fever, but is merely brought into renewed activity by it.

Since Salinger and Leonard's⁷ excellent review up to 1930, the rheumatic origin of nonseptic endocarditis in scarlet fever has become quite generally accepted. According to White,¹⁴ the incidence of heart disease in rheumatic fever is 85 per cent, and in chorea 49 per cent. Granting that this estimate may be too high, the differences between the incidences in these two diseases and that reported in scarlet fever is only too obvious.

Moltschanow¹⁵ reports 17 cases of rheumatic endocarditis in the course of scarlet fever in Moscow. In 2 the endocarditis flared up in the second week, in the other 15, between the third and eighth weeks. In 14 it was simultaneous with the joint symptoms. In only 3 had there been a previous attack of rheumatic fever, yet in 7 out of 13 in which an accurate family history was available there was a definite family history of rheumatic fever. Imrie's⁵ studies are even more impressive. In 1696 cases of scarlet fever in Glasgow he had 6 patients with endocarditis, all of whom gave a rheumatic history, and in 2 a valvular lesion was found on admission to the scarlet-fever ward.

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On the other hand, serious cardiovascular disorders may occur in the wake of scarlet fever; but the results of investigations indicate that these serious disorders are relatively infrequent as compared to those following rheumatic fever and chorea. Indeed, many—if not most—valvular defects found in the course of scarlet fever can be traced back with careful histories to a previous rheumatic or choreic infection.

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	SIRIUS COMPLETED	CASES OF SCARLET FEVER	CASES OF ENDOCARDITIS	INCIDENCE OF ENDOCARDITIS %
Metropolitan Asylums Board, London	1914	121,474	760	0.63
Joc. ¹ City Hospital, Edinburgh	1924	24,102	61*	0.25
McCollom, Plie and Funk, ² Boston City Hospital	1925	2000	13	0.65
Zischinsky, ³ Wilhelminen-Spital, Vienna	1930	20,000	11	0.05
Gordon, ⁴ Herman Kiefer Hospital, Detroit	1931	10,666	78	0.7
Imrie, ⁵ Belvidere Fever Hospital, Glasgow	1933	1616	6†	0.37
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Clinical interest in endocarditis during scarlet

and then suddenly this complication ceased to appear. This supports accumulating evidence that the incidence of various complications in this disease is related to the type of streptococci²³ or to their symbiosis with other infections²⁴

Again and again the pronounced character of these murmurs suggests the possibility of endocarditis, but their benign course eliminates this diagnosis. In the absence of septicemia and unless the patient has a previous history or a family history of rheumatic fever and unless a high sedimentation rate in conjunction with polyarthritis and fever is present, I have come to take the stand that even the most marked murmurs arising in the convalescence of scarlet fever are benign in character. Under these circumstances, the chances of being wrong are exceedingly remote.

Electrocardiographic abnormalities appear to vary in their frequency quite as much as abnormal auscultatory findings. Thus Faulkner, Place and Ohler¹² found abnormal electrocardiograms in only 11 of 171 cases of scarlet fever at the Boston City Hospital. Berger and Olloz²⁵ in Switzerland found alterations in 14 out of 66 simple scarlet fever cases. On the other hand, Wickstrom²⁶ reported 86 abnormalities in 100 cases of scarlet fever at the Epidemic Hospital in Stockholm, in which those showing only a negative T wave in Lead 3 were excluded. The frequency with which abnormal electrocardiograms are reported by this author leaves one skeptical of his interpretations. The electrical alterations that Wickstrom offers as evidence of myocarditis are by no means convincing, and consequently the records would have to be checked carefully before one could accept his interpretations of what actually constitutes deviations from the normal*. The various disturbances enumerated by him showed much the same relation to the toxic stage as they did to the occurrence of late complications, no one complication showing any more of these electrical changes than another. These changes were seen with equal frequency among those toxic cases receiving antitoxin or convalescent serum and in those in which this treatment was not given. Furthermore, the alterations observed in the convalescent stage showed no consistent association with changes in the pulse and temperature. In 19 cases auscultatory signs accompanied the electrocardiographic alterations, but at other times they were entirely independent of one another. No typical alterations were apparent, but Wickstrom believed that the changes were concerned particularly with the conduction system in the left ventricle. In 40 per cent, these alterations

disappeared during convalescence, in 38 per cent during the next six months, and in 28 per cent they were still present after seven and a half months. However, with the interpretations questioned, these observations lack the necessary background to carry weight.

Shookhff and Taran²⁷ in a study of 78 normal children found slight slurring and widening of the QRS complex in Lead 1 or Lead 2 in 35 per cent, inverted T wave in Lead 3 in 25 per cent and abnormally deviated axis in 3 per cent. From ten to fourteen years of age, there was a definite decrease in the incidence of an inverted T wave in Lead 3. In 50 mild scarlet-fever cases these authors found normal P waves and a normal QRS in Lead 1 and Lead 2 and alterations in the T wave in Leads 1 and 2 in 10 per cent and an inverted T wave in Lead 3 in 40 per cent. They did not consider these changes to be evidence of myocarditis.

Van Buchem and Daniels²⁸ found a normal T wave in Lead 3 in 133, or 63 per cent, of their 211 cases of scarlet fever. It was diphasic in 13. These T-wave alterations were rarely present on admission, and in 105 they had disappeared before the end of the isolation period. These electrocardiographic findings are not peculiar to scarlet fever, nor do they constitute proof of myocarditis.

This benign character of the scarlet-fever heart is striking in comparison with the cardiac damage in rheumatic fever even when one knows that physical signs in the latter may disappear^{29, 30}. Indeed, the physical signs of the scarlet fever heart are of a will-o'-the-wisp character as compared with those of rheumatic fever.

The etiology of these benign cardiac signs in scarlet fever has been the subject of much discussion. They have been ascribed to loss of tone of the heart muscle and to dilatation. To these may be added the factor of increased blood flow. Indeed, I am inclined to believe that in some cases the abnormal sound may represent only a forceful heartbeat. On the other hand, some of the coarse murmurs at the base suggest that the signs originate in the epicardium. Probably in some cases the abnormal sounds are simply due to an overactive heart, in addition to a little transient toxic dilatation. The term, "myasthenia cordis," has been used. It has been asserted that the scarlet-fever heart is always associated with loss of body weight,³⁰ and by others that it is the result of "impoverished" blood. These last two relations have been carefully studied by von Koss and Malaguzzi-Valeri³¹ and thrown into the discard for lack of support.

First of all, Are these electrocardiographic changes peculiar to scarlet fever? They most cer-

*Wickstrom's series of 100 cases of scarlet fever was reported as showing 41 cases of disturbances in 67 intraventricular disturbances in 59 of which 75 showed lengthened QRS time and 46 deviated axis, inverted T waves in 33 and at least one of these abnormalities in 86.

tainly are not, since they are found also in many acute infections, such as tonsillitis, rheumatic fever, diphtheria, typhoid fever and pneumonia. Nor can they be said to occur with greater frequency in scarlet fever than in these other infections. They are, however, definitely related to the eruptive stage, and appear again in convalescence with or without the fever of complications, and unrelated to any particular complication. The source of these minor abnormal electrical disturbances, variable heart sounds and sudden changes in rhythm appears to be a local effect of the toxin or of some by-product of streptococcic invasion circulating in the blood stream.

Allergy has been advanced as an explanation for everything in scarlet fever, from the rash to all complications. But it is said that the purified toxin is not allergenic.³² Quite aside from the toxin, there are many other toxic products evolved by the growth of hemolytic streptococci in vivo. Furthermore, the initial damage to the reticuloendothelial cells in the eruptive stage or an antigen-antibody reaction may possibly be a factor in the causation of these benign cardiac signs. Fahr³³ is of the opinion that any attempt to work up an allergic hypothesis for the scarlet-fever heart is taking liberties with the present conception of hypersensitive tissues. However, a violent local antigen-antibody reaction affords the best explanation of the etiology of purpura hemorrhagica^{34, 35} and acute glomerulonephritis,³⁶ both of which are essentially late vascular complications of scarlet fever. Zischinsky^{37, 38} has reported 4 cases of edema of the skin due to blood-vessel damage late in the course of scarlet fever without any evidence of nephritis. This might be ascribed to endothelial-cell damage.

PATHOLOGY

Practically all autopsy material is from septic cases and therefore, of course, represents a toxic condition of the heart common to all fatal streptococcal conditions in which pus formation prevails. Scarlet-fever patients rarely die of the toxin, except in parts of Roumania. The heart in these early fatal cases may escape injury if death occurs in forty-eight hours, just as it may in early deaths from diphtheria. Here death is due to the effect of the toxin on the cerebrum, with delirium and coma accompanied by a very marked tachycardia. If death occurs later in these severe toxic cases, small hemorrhages may be found in the heart, as well as injection of the blood vessels about the bundle of His.

Fahr³³ found perivascular granulomas with large cells "not exactly identical with the giant cells found in rheumatic fever but very similar to them." Stoeber,³⁹ on the other hand, found that the blood

vessels of the myocardium were primarily injured along with the perivascular connective tissue, but to a much less extent than in diphtheria, because severe degeneration of the muscle fibers is never brought about. To him, there is no confusion between the pathology of scarlet fever and that found in diphtheria or rheumatic fever. Magladery and Billings⁴⁰ state that in scarlet fever one finds a diffuse interstitial myocarditis, whereas in diphtheria the lesion is primarily parenchymatous with secondary interstitial involvement, and that in rheumatic fever the myocarditis is almost entirely perivascular in the form of nodes. Aschoff nodes will be well developed if the patient has had a previous attack of rheumatic fever, but if the first attack occurs during the course of scarlet fever, these rheumatic elements will be immature.

Since the typical scarlet-fever heart of the second and third weeks is a characteristically benign condition, the patient who comes to autopsy must succumb from some other complication, which, in its development, would mask any underlying slight lesion if one existed. Therefore, one is not justified in offering explanations based on post-mortem findings in toxic, septic or rheumatic cases.

TREATMENT

Endocarditis and pericarditis of rheumatic origin require the usual treatment outlined under rheumatic fever, with salicylates and digitalis when indicated. However, patients with a rheumatic history who develop pain and swelling in the joints while suffering from scarlet fever often run an unfavorable course and may not respond well to salicylates.⁵ Doses in the maximum scale are frequently necessary to control pain. Digitalization, on the other hand, may be relied on when indicated in cases with old valvular lesions showing congestive failure or auricular fibrillation.

In *endocarditis and pericarditis of bacterial origin*, sulfanilamide should be given. I am speaking here on the basis of a very favorable experience with bacteremia in scarlet fever treated in this way.⁴¹ The higher scale of blood level should be used.⁴² Needless to say, if the bacteremia has proceeded to a vegetative endocarditis, the outlook is exceedingly unfavorable. In very rare cases, recovery has occurred, and immunotransfusion along with sulfanilamide offers a hope that could never be entertained before. Tapping the pericardium may be resorted to, but should be attempted only by experienced hands.

A certain amount of toxic myocarditis accompanies these cases. I have never known drugs of the digitalis group or Coramine, caffeine or camphor in oil—or I might say any drug other than sulfanilamide—to exert any appreciable beneficial effect whatever in these septic cases. Furthermore,

I am under the impression that digitalis has often made a serious condition of this kind worse rather than better.

Patients with myocarditis resulting in cardiac dilatation and failure should receive digitalis, as recommended by Hecht,⁴³ but I have not yet seen such a condition in the course of 12,000 cases of scarlet fever, except through a profound secondary streptococcal septicemia or a mixed infection with diphtheria bacilli. A case of complete auriculo-ventricular dissociation following scarlet fever is described by Bernstein⁴⁴ in which "cardiac decompensation [persisted] despite the use of all known therapeutic measures". Although I have not seen such a case, it is to be noted that Bernstein's patient was discharged from one of the best contagious hospitals, after the subsidence of the scarlet fever, with what appeared to be a normal heart. The electrocardiograph was not used in this case during the course of the disease.

Benign carditis, the so-called "scarlet fever heart", needs no further treatment than rest. This applies to the cases that show a well marked split first sound, obvious murmurs or persistent tachycardia. Abnormal electrocardiographic findings of a mild nature can be safely ignored, and the customary treatment of scarlet fever carried out. The more marked cases require rest in bed until the signs disappear. If the signs appear again when the patient is allowed out of bed, the rest should be resumed for another week, and if they again appear the patient is allowed increased activity of the most gradual form and under close observation. No medicine is necessary. It is assumed that all steps have been taken to rule out the existence of rheumatic fever.

The author expresses his indebtedness to Dr Paul D. White for the clarification of many of the uncertainties in the field of cardiology that beset one who deals with the problems of acute infections.

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REFERENCES

- 1 Joe A. Scarlatinal arthritis. *Edinburgh M J* 31 341 349 1924
- 2 McCollom J. H. Place E. H. and Funk E. H. Scarlet fever. *Oster's Modern Medicine*. Third edition Vol I 845 pp Philadelphia Lea & Febiger 1925 P 64
- 3 Zschinsky H. Scharlach und Endocarditis. *Jahrb f Kinderh* 127 337 353 1930
- 4 Gordon J. E. unpublished data
- 5 Imrie A. H. Antitoxin in the treatment of scarlatina with special reference to the prevention of complications. *Glasgow M J* 119 36-44 1923
- 6 Cooke J. V. Scarlet fever. *Ann Int Med* 11 484-491 1937
- 7 Salinger R. and Leonard M. Heart disease in scarlet fever. *Yale J Biol & Med* 3 251 265 1931
- 8 Swift H. F. Rheumatic fever. *J A M A* 92 701 2053 1929
- 9 Alton J. R. and Jones T. D. Studies of hemolytic streptococcal antibodies in control groups. Rheumatic fever and rheumatoid arthritis. *J Immunol* (in press)
- 10 Schlesinger B. Signy A. G. and Payne W. W. Further studies on the aetiology of acute rheumatism. *Lancet* 11090 1095 1935
- 11 Schlesinger B. Signy A. G. Ames C. R. and Barnard J. E. Aetiology of acute rheumatism: experimental evidence of a virus as a causal agent. *Lancet* 11145 1149 1935
- 12 Falkner J. Place E. H. and Oiler W. R. The effect of scarlet fever upon the heart. *Am J M Sc* 189 352 358 1935
- 13 Paul J. R. Salinger R. and Zuger B. The relation of rheumatic fever to postscarlatinal arthritis and postscarlatinal heart disease—a family study. *J Clin Investigation* 13 503 516 1934
- 14 White P. D. *Heart Disease* 1931 pp New York Macmillan Co 1931 P 326
- 15 Moltischnow W. J. Scharlach und Herzfehler. *Jahrb f Kinderh* 135 129 159 1933
- 16 Wesselhoft C. Communicable diseases: cardioscavicular disease in diphtheria. *New Eng J Med* 223 57 66 1940
- 17 Rosenblum H. A. The heart in scarlet fever. *Arch Int Med* 26 474 480 1970
- 18 Weill E. and Mouriquand G. Myocardite et mort brusque dans la scarlatine. *Presse med* 19 179 1911
- 19 Schmalz H. Die Nachkrankheiten des Scharlach. *Jahrb f Kinderh* 65 132 173 1907
- 20 Lederer R. and Stoltz K. Scharlachherz. *Jahrb f Kinderh* 74 395 420 1911
- 21 Hirsch S. Ueber Herzerkrankungen beim Scharlach. *Med klin* 18 112 1922
- 22 Popovich D. Das Scharlachherz (Myocarditis scarlatinoza). *Wien Klin Wochenschr* 20 1039 1038 1907
- 23 de la Motte H. L. The serological types of haemolytic streptococci in relation to the epidemiology of scarlet fever and its complications. *J Hyg* 40 172 203 1940
- 24 Wesselhoft C. Factors influencing the incidence of otitis media in scarlet fever. *Ann Int Med* 12 1473 1485 1939
- 25 Berger W. and Olloz M. Elektrokardiographische Untersuchungen bei Scharlach und Diphtherie. *Selweis med Wochenschr* 15 992 1922
- 26 Wickström J. Eine elektrokardiographische Untersuchung über das Herz beim Scharlach. *Acta paediat* 14 (Supp 4) 1 150 1933
- 27 Shookoff C. and Taran L. M. Electrocardiographic studies in infectious diseases. *Am Heart J* 6 541 547 1931
- 28 van Buchem F. S. P. and Daniels L. P. Elektrokardiographische Untersuchungen bei akuten Infektionskrankheiten. *Deutsches Arch Klin Med* 14 250 267 1933
- 29 Bland P. Jones T. D. and White P. D. Disappearance of the physical signs of rheumatic heart disease. *J A M A* 107 569 573 1936
- 30 Wolff J. B. and Digilio V. A. Newer concepts in the diagnosis and treatment of juvenile rheumatism. *Arch Pediat* 55 424-427 1938
- 31 von Koss P. and Malaguzzi Valeri O. Zur Aetiology des Scharlachherzens. I. Das Verhältnis zwischen klinischen Symptomen und Körpergewicht. *Arch f Kinderh* 114 203 207 1938 II. Das Verhältnis zwischen klinischen Symptomen und Blutarmut. *Ibid* 114 207 214 1938
- 32 Hooker S. B. Studies of scarlet fever. I. The allergic versus the toxin antitoxin hypothesis. *J Immunol* 24 65 83 1933
- 33 Fale T. Vergleichende Herzerkrankungen bei Scharlach Streptokokkeninfektion und rheumatischer Granulomatose. *Beitr z path Anat u z allg Path* 85 445 468 1930
- 34 Box C. R. On complications of the specific fevers with especial reference to scarlet fever and measles. Lumen lectures. *Lancet* 1 1217 1223 1271 1276 1327 1333 1933
- 35 Gibson A. G. and Hobson F. G. Haemorrhagic purpura following scarlet fever: report of two cases in one family. *Lancet* 1599 511 1932
- 36 Wesselhoft C. Nephritis in scarlet fever and its treatment. *J A M A* 116 36 38 1941
- 37 Zschinsky H. Eine ungewöhnliche Form von Gefäßschädigung beim Scharlach. *München med Wochenschr* 83 1960 1967 1936
- 38 Idem. Eine ungewöhnliche Form von Gefäßschädigung beim Scharlach. *München med Wochenschr* 84 1448 1937
- 39 Stoeber T. Ueber Myokarditis bei Jugendlichen besonders Scharlach myokarditis. *Arch f Kinderh* 105 193 218 1935
- 40 Magdiery I. W. and Billings F. T. Ueber die Unterschiede in der Stärke der Scharlachmyocarditis bei den einzelnen Epidemien. *Beitr z path Anat u z allg Path* 97 205 212 1936
- 41 Wesselhoft C. and Smith E. C. The use of sulfanilamide in scarlet fever. *New Eng J Med* 219 947 953 1938
- 42 Long P. H. and Bliss F. A. Toxic manifestations of sulfanilamide. *Ann Surg* 105 808 812 1938
- 43 Hecht A. F. Kreislaufstörungen bei Infektionskrankheiten. *Wien Klin Wochenschr* 46 1476 1933
- 44 Bernstein M. Auriculoventricular dissociation following scarlet fever: report of case. *Am Heart J* 6 582 586 1938

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27221

PRESENTATION OF CASE

A fifty-three-year-old Polish housewife entered the hospital complaining of abdominal pain.

The patient felt perfectly well until the onset of general malaise six months before admission. There was, however, no specific complaint until two months before admission, when an aching pain developed in the upper abdomen, which radiated to the back and seemed to be initiated by food and relieved by fasting. Anorexia and weight loss soon appeared, so that at the time of admission her weight had dropped 40 pounds. Finally, a physician was called, who felt a mass in the patient's abdomen and sent her into the hospital.

At no time had the patient noticed chills, fever, nausea, vomiting, jaundice or change in the character of her stools. Although there were no subjective urinary symptoms, the urine had been dark for the previous two months.

The past and family histories were irrelevant.

On examination the patient was well developed and pale, and showed evidence of recent weight loss. The heart and lungs were essentially normal; the blood pressure was 175 systolic, 90 diastolic. A large, tender, freely movable, superficial mass was palpable in the right upper quadrant of the abdomen, which moved with respiration. Tenderness was present in the right costovertebral angle. A pelvic examination was negative.

The temperature was 99°F., the pulse 85, and the respirations 20.

The urine showed a + test for albumin and an orange sugar reaction. The sediment contained from 4 to 6 white cells per high-power field. The blood showed a red-cell count of 3,200,000 with a hemoglobin of 70 per cent, and a white-cell count of 7500. The nonprotein nitrogen of the blood serum was 28 mg., the sugar 272 mg., and the protein 6.9 gm. per 100 cc.; the chlorides were 96.3 milliequiv. and the carbon dioxide combining power 26.2 milliequiv. per liter. The serum van den Bergh was normal.

X-ray films of the chest and a barium enema were negative. With a Graham test there was no filling of the gall bladder, and the right kidney appeared enlarged; no stones were seen.

An intravenous pyelogram revealed the right kidney to be about twice the size of the left and slightly lobulated. The dye was excreted promptly on both sides and filled apparently normal pelvises and ureters. The substance of the right kidney appeared unusually large for the size of the pelvis; the calyces were a little long. A retrograde pyelogram on the right side was unsatisfactory because of motion. The spiderlike formation of the upper and middle calyces was again visible.

An electrocardiogram showed normal rhythm at 100, with a PR interval of 0.15 second. There was low voltage in Lead 3 and a slightly inverted T₃; Lead 4 was normal.

A cystoscopic examination one week after admission revealed nothing abnormal. Four days later an operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. ROBERT R. LINTON: My function in discussing this case, of course, is to tell you what the mass in the right upper quadrant was. There are four definite possibilities that must be considered with a right upper-quadrant tumor. One of these is an enlarged gall bladder or an associated increase in the size of the liver, which we shall consider as one condition. Another is a kidney tumor. A third is a tumor of the hepatic flexure of the colon, or perhaps the ascending colon, or the beginning of the transverse colon. And a fourth is a tumor in the region of the pylorus.

To begin with the last possibility first, we have no evidence that the patient had any special gastrointestinal symptoms except for anorexia and weight loss. She felt worse after eating food, and was relieved by not eating; perhaps this indicates some interference with her digestive processes. I am a little at a loss to know why they did not do a gastrointestinal series. Apparently they did not, so that we can get no help from the x-ray findings in regard to the stomach and pyloric region. I doubt very much whether this condition was associated with the stomach, however, and I should like to pass on to the tumors of the colon. The hepatic flexure is one of the hardest parts of the colon to visualize by x-ray. We have the statement, however, that a barium enema was negative, a finding which accords with the fact that the stools were normal. Furthermore, I should not expect tumor of the hepatic flexure to be as freely movable as this was. It is possible to have a carcinoma of the cecum in which the right colon is very freely movable, that is, not fixed to the abdominal wall as it normally is. It would therefore be possible to move such a carcinoma of the cecum around quite freely. In view of the nega-

tive barium enemā and the normal stools, I do not believe that this was a tumor of the colon

The third possibility to consider is a kidney tumor, and there was evidence by x ray and intra venous pyelogram that there was an enlarged kidney on the right. It seems unlikely from the description, however, that this could possibly have been a kidney tumor, since it was described as a superficial mass and was very freely movable. The urine examination does not help us very much. The patient did have diabetes, judging from the urinary findings and the blood sugar value, but I do not believe that had anything to do with the diagnosis of tumor in the right upper quadrant.

The fourth possibility, of course, is the gall bladder. Was this mass an enlarged gall bladder? In favor of that is the location and size of the tumor, and the fact that it was described as being fairly superficial and freely movable. I am a little surprised that the patient had lost 40 pounds in weight, if this was simply an enlarged gall bladder. We have additional x ray evidence that the gall bladder was not visualized, that is, the Graham test was positive. Because of these findings I am going to make a diagnosis of hydrops of the gall bladder.

DR GEORGE W. HOLMES: So far as the x rays are concerned, the interest is centered around the gall bladder and kidney. I shall not take the time to show the chest and enema films, which were reported as negative. The Graham test, like any test in which one must make a positive diagnosis on negative findings, must always be taken with a grain of salt. If this patient had taken food during the interval, or if anything had gone wrong with the test, we should report it as a positive finding. The most striking thing is the enormous size of the right kidney. One occasionally sees a large kidney as an anatomic variation, but there is also almost invariably a small kidney on the other side. This patient's left kidney is approximately normal in size and shape, and the right kidney is not only more than twice that size but also rather round. The injected pelvis does seem to be displaced upward a little, and the upper calyx is elongated but is within normal limits. An anatomic variation might account for that, but I do not believe it would account for the size and shape of that kidney, so that I should be very much surprised if there was not disease in the right kidney. Whether that was the clinical diagnosis is another question. It does not seem likely.

DR WILLIAM B. BREED: I take it when you say hydrops that you mean a gall bladder distended with fluid.

DR LINTON: Probably clear fluid.

DR BREED: Then should you not want to give some explanation of the obstruction, such as a stone, cancer of the ampulla or something of that sort?

DR LINTON: I do not believe that hydrops of the gall bladder ever occurs without a stone impacted in the cystic duct. With a common duct stone there is always bile in the gall bladder, sometimes so-called 'white bile,' but there is seldom if ever a huge dilated gall bladder. Hydrops to the surgeon means obstruction of the cystic duct, practically always due to a stone and nothing but clear mucus within the gall bladder.

DR F. DENNETTE ADAMS: How often do you see that without superimposed acute infection?

DR LINTON: I should say quite often. There is seldom infection in this type of gall bladder disease.

DR REED HARWOOD: Do you think it would account for malaise, weight loss and anemia?

DR LINTON: The weight loss bothered me. It seemed unusual.

DR BREED: The diabetes might cause loss in weight, might it not?

DR LINTON: Yes, it might. The question is, How long was the diabetes present?

DR RICHARD H. SWEET: The X ray Department and some of the house staff were much impressed by the size of the kidney, but those who paid attention to their sense of touch would certainly have made a diagnosis of hydrops of the gall bladder. I do not believe one could have called it anything else. We operated with that diagnosis and that is what the patient had, but on freeing up the gall bladder I discovered that there was a mass of abnormal tissue in the region of the cystic duct and ampulla. It appeared to me like carcinoma. An impacted stone in the cystic duct obstructed the gall bladder. Under the circumstances it seemed to me better surgery to take it out than to drain it. We did a simple and easy cholecystectomy. The kidney on palpation was definitely large, but I could not ascertain whether there was tumor in it.

CLINICAL DIAGNOSES

Carcinoma of gall bladder
Diabetes mellitus

DR LINTON'S DIAGNOSES

Hydrops of the gall bladder, with stone impacted in the cystic duct
Diabetes mellitus

ANATOMICAL DIAGNOSES

Carcinoma of the gall bladder.
Hydrops of the gall bladder.
Stone in the cystic duct.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: The gall bladder had a very thick wall, and sections of it showed adenocarcinoma of a very anaplastic character. The network of lymphatics between the gall bladder and the liver is very rich. Extension of the liver occurs so easily in cases of carcinoma of the gall bladder that chances of surgical cure are minimal. Grossly there was no obvious invasion of the liver.

DR. SWEET: There was none, but I was certain that cancer must have been left behind, in shell-ing it out from the adjacent tissues. The common duct was not involved.

DR. BENJAMIN CASTLEMAN: Had the hydrops been formed by the stone impacted in the cystic ducts?

DR. SWEET: Yes.

DR. HOLMES: You still do not know about the kidney?

DR. MALLORY: No.

DR. HOLMES: I am not convinced that it was not abnormal.

CASE 27222

PRESENTATION OF CASE

A sixty-seven-year-old man entered the hospital complaining of extreme weakness.

The patient was brought to the hospital in an ambulance, and at the time of examination displayed extreme air hunger and was unable to speak above a whisper. It appeared that three weeks before admission he had suffered a "fainting spell," and since that time had remained in bed because of an ever-increasing weakness. During these weeks before entry, he had several chills and suffered from frequency of urination, small amounts being passed at a time, with sudden stopping and starting of the stream. He had not noticed a change in the color of the urine. For the previous year he had been aware of exertional dyspnea, and had reputedly been helped by digitalis a few months before entry.

On examination the patient was well developed and lean, with a dry pale skin, dirty tongue and uremic breath. The heart was not enlarged to percussion, and the sounds were distant and of poor quality; the blood pressure was 120 systolic, 80 diastolic. The lungs were normal. Abdominal

and rectal examinations were negative. The bladder could not be palpated or percussed. The prostate was not enlarged. There was no peripheral edema.

The temperature was 100°F., the pulse 80, and the respirations 40.

The urine was acid, the highest specific gravity being 1.015; it showed a ++ test for albumin, and the sediment contained a few red cells and many white cells per high-power field. A culture yielded a moderate growth of colon bacilli. The blood showed a red-cell count of 2,850,000 with 55 per cent hemoglobin, and a white-cell count of 28,700 with 91 per cent polymorphonuclears. The non-protein nitrogen of the blood serum was 90 mg., and the protein 67 gm. per 100 cc. The chlorides were 117.6 milliequiv. and the carbon dioxide combining power 12.9 milliequiv. per liter, and the calcium 7.7 mg. and the phosphorus 4.2 mg. per 100 cc.

X-ray films of the chest and abdomen were negative.

An electrocardiogram showed sinus tachycardia (110-120), a PR interval of 0.18 second and a tendency to low voltage. ST₁ and ST₂ were sagging, and a few of the ventricular complexes had a slightly different form from usual. In Lead 3, some complexes were upright, and others inverted, but these changes were believed to be due to respiration. The T waves were low or inverted.

The patient was given intravenous fluids, digitalis and sodium citrate; closed drainage of the bladder and irrigation with potassium permanganate were instituted. On the following day, the temperature dropped to normal, but the respirations were still sighing and rapid. The urine remained about the same, although the number of white blood cells was much less. With a fluid intake of 4500 cc., the urinary output was 1500 cc., and this ratio was maintained throughout hospitalization. On the third hospital day, the temperature rose to 104°F. and the pulse to 150. Rales were present at both lung bases, and the calves were found to be tender on pressure and during forced dorsiflexion of the feet. An x-ray film of the chest showed increased density on the left side behind the heart, suggestive of consolidation. The next day the left leg was red, swollen and tender; the nonprotein nitrogen had risen to 130 mg. per 100 cc.; the chlorides were 114.3 milliequiv. and the carbon dioxide combining power 17.3 milliequiv. per liter. Peripheral edema gradually increased and involved the hands; an infected bulla developed on the left foot; terminally the nonprotein nitrogen was 143 mg. per 100 cc. Death occurred on the ninth hospital day.

DIFFERENTIAL DIAGNOSIS

DR. RICHARD J. CLARK: We are given very little information about the past history of this patient, and no inkling as to whether he had any previous renal difficulty. We first come to the story of dyspnea, which was supposedly helped by digitalis during the previous year. Yet when the patient was examined in the hospital the heart did not appear to be enlarged. The sounds were rather weak and of poor quality, as we might expect in a man of his general debility, but there were no pathognomonic signs on entry to suggest any specific primary heart difficulty. We are aware of no history of coronary or anginal pain. The electrocardiogram might suggest some degree of myocardial disease or of coronary insufficiency, but nothing specific. This makes us rather suspect that the weakness and dyspnea during the year prior to entry might have been associated with developing anemia and the beginning of nitrogenous retention, rather than being dependent on a primary cardiac difficulty. The fainting spell three weeks before entry is not sufficiently reported to give any specific clue of its nature. It may have represented a small coronary thrombosis, but there is nothing in the electrocardiogram at the time of entry that would bear that out. It seems very possible that this may have marked the beginning of an infection.

The patient entered the hospital in a markedly uremic and acidotic state, as evidenced by the physical examination and by the laboratory findings. He was very much dehydrated, and in spite of his dehydration the specific gravity of his urine apparently did not go above 1.015. He had a fairly marked degree of what I suppose was secondary anemia. There is no description of the blood to suggest any specific type of anemia. I suspect that this degree of secondary anemia probably went back farther than the three weeks of the acute illness described here, and that it was associated with a more chronic situation, which had been brewing for some time prior to entry.

With all these findings, my first thought is that the patient very probably had a chronic glomerulonephritis that had been going on for some time and was passing into the final stages of renal failure at the time he came to the hospital. He had a low blood pressure, but I suspect that before his state of marked weakness on entry it may well have been higher than the record indicates. It would be of interest to know what the eyegrounds showed, and whether there was evidence of old chronic vascular disturbance.

During the three weeks prior to entry, there was definite evidence of urinary-tract infection, with

frequency and chills. We are told that the patient had some trouble in starting and stopping his stream. This is not a very striking symptom in view of his debility. We are told that his prostate felt normal by rectum. Of course, we cannot tell what the median lobe may have been like. There was no cystoscopic examination or x-ray examination to give any lead as to the nature of the possible block in the urinary tract. The patient might have had an old stricture that flared up with the infection. At any rate, we know he had a definite colon-bacillus infection, which I am inclined to believe was primarily in his bladder. He may have had some degree of ascending urinary-tract infection, and yet he did not have any high fever at the time of entry. There is no record of pus, casts or cell clumps in his urine, findings that we might have expected with a severe degree of pyelitis or with pyelonephritis, which also has to be considered. I do not see how we can make any such positive diagnosis. Also no mention is made of renal pain. Furthermore, on the day after entry to the hospital when the patient was put on drainage and the bladder irrigated, the white cells in the urine decreased and the temperature also dropped. In spite of this, he still had marked signs of acidosis and uremia. For these reasons I am inclined to interpret this as a secondary infection in the urinary tract, which was probably not the primary cause of his difficulty. I believe that he probably had a cystitis and possibly some degree of ascending infection superimposed on previously damaged kidneys.

The question arises whether he had any other type of renal lesion. Certainly, with a story of intermittent blocking of the urinary flow, we must think of anything that produces hydronephrosis, possibly a secondarily infected hydronephrosis, which might have accounted for a fairly complete renal failure toward the end. We might also think of polycystic kidney or cancer in the course of the urinary tract. There is no history of any gross hematuria, a fact that is somewhat against these diagnoses, and no story on physical examination of any enlarged or tender kidneys, and I gather from the abdominal plates that no enlarged kidneys were made out. If the patient had been in better health, we certainly should like to have seen a pyelogram, but with the evidence at hand I do not believe that there is any definite basis on which we can make a diagnosis of any other type of kidney disturbance. The urinary output failed to keep pace with the intake, and he developed edema, evidence of water as well as nitrogenous retention, as we might well find in the terminal stages of glomerulonephritis with involvement of

the tubules as well. Under treatment there was practically no improvement of the uremia and very little change in the acidosis.

On the third hospital day, there was a sudden rise in pulse and temperature, with rales beginning at the lung bases. X-ray films at this time are said to have revealed an area of consolidation in the left chest behind the heart. Coincident with this, signs and symptoms indicative of phlebitis developed in both legs, most prominently on the left.

This brings us to the question of whether, with the sudden rise in pulse and temperature, the patient developed a pneumonic process in the lungs, or whether this represented pulmonary infarction. With the obvious evidence of phlebitis, it seems to me that infarction is considerably more likely than pneumonia. It also seems unlikely that a man so obviously moribund would have lived as long as six days after the onset of a terminal pneumonia. To be sure, there was no pain, hemoptysis or increased dyspnea; but these factors are not necessary to make the diagnosis of pulmonary embolism, which I believe the patient had.

The infected area on the left foot strongly suggested the presence of terminal septicemia, which may well have occurred with a uremic death of this type. I should say that the diagnoses were chronic glomerulonephritis, with uremia and acidosis, a fairly severe secondary anemia, cystitis, possibly ascending pyelitis, possibly median-lobe prostatic obstruction, phlebitis of the left leg, recent terminal pulmonary embolism, terminal septicemia and possibly coronary sclerosis.

DR. TRACY B. MALLORY: In any case of renal insufficiency there is always room for a wide range of clinical diagnoses. Does anyone wish to suggest any other form of renal disease as a possibility?

DR. HELEN PITTMAN: Was any search made for Bence-Jones protein?

DR. MALLORY: I do not believe so. It was not recorded.

DR. BENJAMIN CASTLEMAN: I should like to ask whether Dr. Clark thinks this man's age might be good evidence against chronic glomerulonephritis.

DR. CLARK: Yes; of course that would be a factor against it, but does not necessarily rule it out. Nephrosclerosis would be more likely at this age.

DR. BERNARD JACOBSON: I should like to ask whether Dr. Clark is not worried by the water retention. Do you think that is common in terminal uremia?

DR. CLARK: It may be present in a terminal com-

plete renal failure involving both the glomeruli and tubules.

CLINICAL DIAGNOSES

Chronic nephritis.

Uremia.

Thrombophlebitis of legs.

DR. CLARK'S DIAGNOSES

Chronic glomerular nephritis, with uremia and acidosis.

Secondary anemia.

Cystitis, possibly with ascending pyelitis.

Prostatic obstruction?

Phlebitis of leg.

Pulmonary infarction.

Terminal septicemia.

Coronary sclerosis? .

ANATOMICAL DIAGNOSES

Acute and chronic pyelonephritis.

Bacterial endocarditis (colon bacillus).

Rheumatic endocarditis, healed mitral.

Pulmonary edema.

Thrombophlebitis, bilateral popliteal, left femoral and iliac.

Cholelithiasis.

Cellulitis, left foot.

PATHOLOGICAL DISCUSSION

DR. MALLORY: The diagnosis on the wards was the same as Dr. Clark's. At post-mortem examination the outstanding findings were in the kidneys, which were extremely enlarged, the pair of them weighing 540 gm. The capsule stripped quite readily, and it immediately became apparent that both kidneys were filled with abscesses of all sizes and ages. The pelves were not significantly dilated. The bladder showed a mild cystitis. The prostate was normal. There was therefore no particular evidence that this infection of the kidneys was ascending in character. The heart showed slight old deformity of the mitral valve and also a few fresh vegetations, bacterial in character. The post-mortem culture showed colon bacillus, a finding that we often tend to discard, but it did occur in a pure culture, and cultures from the renal abscesses also showed colon bacillus in pure culture, so that I am inclined to think this was significant and that the endocarditis was actually due to the colon bacillus. The question might be put as to whether the bacterial endocarditis was primary and the renal abscesses secondary, but I think that is rather unlikely. The extent of the renal infection

was so great and its chronicity so evident that I am quite sure it preceded the endocarditis. Both popliteal veins showed thrombophlebitis, extending on the left up the femoral and iliac veins almost to the vena cava, but no emboli had broken off and there were no pulmonary infarcts. The lungs showed a rather diffuse pulmonary edema and very questionable early pneumonia, so I think that the signs observed for a period of six days were chiefly due to edema and not to pneumonia.

DR ALFRED KRANES: What was the origin of the renal abscesses?

DR MALLORY: I do not know. We see a significant number of cases of very severe diffuse pyelonephritis for which we never find anything to

suggest the portal of entry of the infection. I think the majority of these cases run their course as cases of obscure sepsis, with not much evidence of renal insufficiency. This case was rather exceptional, since the symptoms of insufficiency predominated throughout the story. We have seen a number of cases of pyelonephritis almost as diffuse as this, with only slight terminal renal insufficiency.

DR KRANES: This must have been going on for more than three weeks.

DR MALLORY: Without any question I should think it must have run back months at least. I should assume that the patient had been having renal insufficiency since the onset of the anemia and dyspnea.

The New England Journal of Medicine

Formerly the
Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of
THE MASSACHUSETTS MEDICAL SOCIETY
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MATERIAL for early publication should be received not later than noon on Saturday.

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MEDICAL-COSTS INSURANCE BILL

HOUSE Bill No. 2301, sponsored by the Massachusetts Medical Society and designed to permit the formation of a corporation or corporations the function of which is to provide means of meeting the costs of medical care on a nonprofit insurance basis, was passed by both branches of the Legislature last week and was signed by Governor Saltonstall on May 22, the day of the celebration of the one hundred and sixtieth anniversary of the Society.

Permissive legislation having been granted, it now behooves the Society to take the necessary steps toward the formation of such a corporation and to devise rules and regulations, which must be submitted to the Commissioner of Insurance

for approval. Much remains to be done, but at least the initial effort has had the support of the people of the Commonwealth.

ANNUAL MEETING

THE one hundred and sixtieth annual meeting of the Massachusetts Medical Society, the oldest state medical society in the United States with a continuous existence, was held at The Copley-Plaza, Boston, May 21 and 22.

The scientific exercises were conducted through the forenoons and afternoons of both days with an attendance exceeding the capacity of the accommodations. Space for the section meetings, which were conducted during the luncheon hour on May 21, was provided in other rooms or in other hotels. The record for general registration of members, 1525, is the largest in the history of the Society. The luncheon meetings of the sections were attended as follows: medicine, 148; obstetrics, 77; pediatrics, 56; dermatology, 53; anesthesiology, 34; radiology, 13; and surgery, 85.

This meeting was reminiscent of conditions twenty-four years ago, when the medical profession was adjusting its problems to the perplexities incident to an impending world war, for doctors throughout the nation are again grappling with the exacting demands of both military and civil service for preparedness in meeting the threatening conditions in connection with another world war. Because of this situation, the afternoon of the second day was given to the presentation of important phases of war surgery.

The business of the Council was carried forward with dispatch on the morning of May 21, so that the councilors were free to attend other exercises in the afternoon. The reports of standing and special committees, the appointment of new committees and the election of officers constituted the main items of business. The officers nominated and elected are as follows: president, Frank R. Ober, of Boston; vice-president, Edward P. Bagg, of Holyoke; secretary, Michael A. Tighe, of Lowell; treasurer, Charles S. Butler, of Boston; and orator, William B. Castle, of Boston. At the adjourned session on the following day, after the

adoption of the amendments to the by-laws by the Society, George L. Schadt, of Springfield, was elected to the newly created position of president-elect; he will become president at the close of the annual meeting in 1942. All the details of this meeting will appear in the official report to be published in an early issue of the *Journal*. On the evening of May 21, the members and their guests met for the annual dinner. After a few explanatory remarks and introduction of the incoming president and the guests from the other New England states, President Walter G. Phippen presented Dr. Nathan B. Van Etten, president of the American Medical Association. His address dealt with the situation confronting organized medicine and the practitioner at the present time, with the assertion that the physicians of this country must assume leadership in strengthening the courage and purpose of the people to maintain the American standards of civilization. Dr. Van Etten stated that with the drafting of men for military training and service, forty thousand doctors will be required, so that definite responsibilities rest with those in civil life in connection with home and hospital service and medical education. He paid well-deserved tribute to the American Medical Association for its organization and support of medical education and its assistance to the Government in various activities. He deplored the lay misconception of the position that this association occupies in serving the country and upholding the traditions of the profession. His appeal for loyalty to the nation and readiness for all to serve in every possible way in promoting the successful administration of the government was well expressed. Then, Dr. Frank H. Labey, president-elect of the American Medical Association, was introduced. He emphasized the privileges of a democracy in its freedom of action, speech and the press for the individual and the minority, which is of great educational importance, but warned the audience that when the Government, after study of conditions and arguments, comes to the adoption of plans of action, all dissensions must cease and all agencies and individuals must unite in support of adopted plans; otherwise democracy will fail and disintegrate.

These moving addresses should lead to a study of the arguments, facts and opinions expressed by these two able representatives of organized medicine.

After the adjournment of this meeting, the Society convened to hear the Shattuck Lecture by Dr. Alton Ochsner, of New Orleans, under the title "Thrombosis and Thrombophlebitis." The speaker discussed the etiology, pathology and treatment of the conditions included in the title in a fashion that clarified any misunderstanding about the disabilities, the results if untreated, and the benefits following approved methods of therapy. No ordinary reference to this lecture can give an adequate appreciation of the clear and forceful presentation of the subject. Fortunately the paper will be published, and can be enjoyed by all who are interested.

The program arranged by the Ladies' Committee was most successful. A total of 175 registered, and almost all participated in the scheduled events, which included tea at the Gardner Museum, dinner at the Ritz Roof, Hotel Ritz-Carlton, and a trip to and luncheon at the South Shore.

Forty-two fellows played one or more rounds of golf in the tournament at the Commonwealth Country Club.

The annual meeting of the Society convened at eleven o'clock on the second day. The first business was the report of the Secretary *pro tempore*, showing that the Society began the year with 5542 members and that in spite of 104 deaths, 17 retirements and 49 deprivations the net gain by readmissions and restorations was 97, bringing the membership to 5639. The amendments to the by-laws of the Society that had been approved by the Council were presented and adopted, and a vote of thanks to the Committee of Arrangements was passed in recognition of the well-arranged program. The President's report on the condition of the Society showed a normal growth of this body. After a warm tribute to Dr. Alexander S. Begg, the recently deceased secretary, he complimented the Treasurer for the able administration of his office, the committees for devoted service to the best interests of the corporation and the members of district societies for their

co-operation in matters pertaining to the general welfare of the Society. He impressed on the audience that much remains to be done to carry forward the useful functions of the Society in meeting the needs of the people of the State. He urged the creation of an executive committee of the Council, as defined in the by-laws, and the selection of an executive secretary, who would be of great assistance to the officers and committees of the Society. He then presented Dr. A. Warren Stearns, who delivered the Annual Discourse.* This address stands as a notable addition to the long list of papers read at annual meetings of the Society. Dr. Stearns led the audience through the history of evolution of the human race, in comparison with individual and collective experiences with a growing forest, and finally showed where the human race stands in its responsibility to meet the needs of all classes of the population. The address was well conceived, the main theme was skillfully handled, and enough wit and humor were interspersed to keep attention focused on the facts presented.

These sketchy references to a meeting of the Massachusetts Medical Society are designed not as tributes to the standing and accomplishments of this venerable society, for none are needed, but only as hints that careful study of the papers read during the session and of the action taken by the Council is incumbent on those members who are willing to share the responsibilities of maintaining the usefulness of this organization.

*Stearns, A. W. The role of the physician in a competitive society. *New Eng. J. Med.* 224:879-890, 1941.

TREATMENT OF BRAIN TUMORS IN CHILDREN

MODERN therapy is founded upon accurate diagnosis. Abundant examples are found in current medical teachings. In the field of infectious disease the correct use of chemotherapeutic agents should be guided by accurate knowledge concerning the nature of the infectious agent. In the field of neoplastic diseases it has been recognized for many years that the most accurate and reliable method of reaching the correct decision con-

cerning the nature of a suspected new growth is by gross and microscopic examination of an adequate sample of tissue. Lacking such a control, opinions concerning prognosis are open to grave questions, and evaluation of therapeutic procedures is practically impossible. Even more serious is the situation that occurs when the most successful means of treating a tumor are not used because of an incorrect conclusion concerning the nature of the neoplastic process. The unfortunate consequences of x-ray therapy based on inadequate diagnosis are illustrated by a paper in the present issue of the *Journal*. That the medulloblastoma is the only cerebellar tumor in infants and children has been a belief which has spread without proper support. It is possible that this impression goes back to Cushing's early work on medulloblastoma, which attracted wide attention, although he pointed out in a later paper the greater frequency of astrocytoma. In the series of brain tumors in infants and children cited by Ingraham and Campbell, the astrocytoma was actually found to be commoner than the medulloblastoma in the subtentorial region. An astrocytoma has a relatively good prognosis if removed surgically, but is not radiosensitive. A medulloblastoma is radiosensitive, and surgery, in addition to radiation, is the recommended treatment. But, even if the proportions of these two types were reversed, there is no justification for treatment of a tumor in a given patient on a purely statistical basis. Until a method is discovered of determining the nature of a new growth in a manner as accurate as that supplied by histologic examination, the generalization should be followed that no brain tumor, particularly in a child, should be treated by radiation therapy until surgical exploration has yielded sufficient material for histologic diagnosis of the tumor.

It has been only relatively recently that intracranial tumors of early life have been recognized in any considerable numbers. In the face of this distinct advance it would seem very unfortunate to lose opportunities for favorable results by instituting the wrong treatment, particularly when this treatment is based on incorrect statistical evidence.

MEDICAL EPONYM

HODGKIN'S DISEASE

Thomas Hodgkin (1798-1866), pathologist at Guy's Hospital, London, wrote a paper, "On Some Morbid Appearances of the Absorbent Glands and Spleen," which was presented at a meeting of the Medical and Chirurgical Society of London on January 10 and 24, 1832, and printed in the *Medico Chirurgical Transactions Published by the Medical and Chirurgical Society, London* (17:68-114, 1832). This treatise consists of a series of seven autopsy protocols and two case reports. Probable cases of tuberculous adenitis and leukemia were included in the series.

It may be observed that notwithstanding some differences in structure, . . . all these cases agree in the remarkable enlargement of the absorbent glands accompanying the larger arteries, namely, the glandulae concatenatae in the neck, the axillary and inguinal glands, and those accompanying the aorta in the thorax and abdomen. . . this enlargement appeared to be a primitive affection of those bodies, rather than the result of an irritation propagated to them from some ulcerated surface or other inflamed texture through the medium of their inferent vessels. . . Unless the word inflammation be allowed to have a more indefinite and loose meaning than is generally assigned to it, this affection of the glands can scarcely be attributed to that cause, since they are unattended with pain, heat, and other ordinary symptoms of inflammation, and are not necessarily accompanied by any alteration in the cellular or other surrounding structures, and do not shew any disposition to go on to the production of pus or any other acknowledged product of inflammation.

R W B

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS
AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., Secretary
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SEPARATED PLACENTA AND ECLAMPSIA
ASSOCIATED WITH CESAREAN SECTION
AND FOLLOWED BY DEATH

A twenty-four year old para III was first seen at a clinic in the thirty-sixth week of pregnancy, the blood pressure was 190 systolic, 120 diastolic and there was a large trace of albumin in the urine.

The two previous pregnancies had been uneventful, one terminated in a low forceps delivery, and

the other was normal. There was no history of any disease.

The patient was treated for toxemia in a hospital for three days, after which she left the hospital against advice. She returned to the hospital a week later because of uterine hemorrhage and very acute abdominal pain. She was not in labor.

On physical examination the heart was not enlarged, and there were no murmurs. The lungs were clear and resonant, there were no rales. The uterus was enlarged to a size consistent with her dates and was spastic. The fetal heart could not be heard. A diagnosis of premature separation of the placenta was made, and cesarean section was decided on. While being prepared for operation, the patient had a severe convulsion. A classic cesarean section was performed after a transfusion of 200 cc. of citrated blood had been given. The fetus was stillborn. Two hours after operation the patient died.

Comment. Much of the disaster in this case can be attributed to lack of prenatal care, either because of ignorance on the part of the patient or because facilities for prenatal care of patients of the very low income group were unavailable to her. She did not appear at the clinic until she was in her thirty-sixth week, at which time she had a large trace of albumin and an elevated blood pressure. Medical treatment was immediately instituted, but the patient refused to remain in the hospital. If the seriousness of the condition were sufficiently impressed on this patient before she left the hospital, the subsequent convulsion can hardly be said to be the fault of the medical profession. However, the treatment, when the diagnosis of separated placenta was made, was not that which is generally recognized as the safest.

This patient apparently had a severe external hemorrhage, which is a condition not commonly associated with separated placenta. At operation the placenta was found to be entirely separated, a large clot lying between it and the uterine sinuses. The present method of treating such eclamptic patients is to rupture the membranes, pack the cervix and vagina tightly with sterile gauze, apply a Spanish windlass, and treat the convulsions conservatively. In Boston the use of magnesium sulfate and morphine is considered the safest procedure. Some clinics are using veratrum viride in cases of this sort.

This patient was poorly handled medically after the placenta separated and after the appearance of eclampsia. Had she stayed in the hospital and had her blood pressure not come down, induction of labor would undoubtedly have been decided on, and it is likely that the final result might have been averted.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

DEATHS

BIANCO—JOSEPH A. BIANCO, M.D., of Boston, died May 23. He was in his sixtieth year.

Dr. Bianco received his degree from Harvard Medical School in 1904. He was a member of the Massachusetts Medical Society and the American Medical Association.

His widow survives him.

DALY—WILLIAM J. DALY, M.D., of Brookline, died May 17. He was in his sixty-ninth year.

Born in Boston, Dr. Daly graduated from the University of Berlin and received his degree from the Harvard Medical School in 1895. He was a former member of the Massachusetts Medical Society.

His widow, a daughter, two sons, three sisters and three brothers survive him.

FAIR—JOHN F. FAIR, M.D., of Cambridge, died May 20. He was in his seventy-third year.

Dr. Fair was physician for the Cambridge Latin School, and was a fellow of the American Medical Association and a member of the Massachusetts Medical Society.

FRAME—JOSEPH FRAME, M.D., of Rockland, died May 24. He was in his seventy-sixth year.

Born in Shubenacadie, Nova Scotia, Dr. Frame graduated from Harvard Medical School in 1894. He was assistant examiner of Plymouth County, and was a member of the Massachusetts Medical Society and the American Medical Association.

His widow, two daughters and four sons survive him.

McCARTHY—JOHN C. McCARTHY, M.D., of Malden, died May 22. He was in his seventy-third year.

Born in Lee, Dr. McCarthy graduated from Harvard Medical School in 1891. He was a former member of the Massachusetts Medical Society.

His widow, two daughters and two sons survive him.

NAVARRO—VINCENTE A. NAVARRO, M.D., of Medfield, died May 15. He was in his forty-sixth year.

Dr. Navarro received his degree from the University of Maryland School of Medicine and College of Physicians and Surgeons, Baltimore. He was a member of the Massachusetts Medical Society and the American Medical Association.

NEW HAMPSHIRE MEDICAL SOCIETY

DEATHS

LAMB—ZENAS F. LAMB, M.D., of Keene, died April 28. He was in his seventy-seventh year.

Born in Athol, Massachusetts, Dr. Lamb graduated from Bellevue Hospital Medical College, New York City, in 1887. He was a member of the American Medical Association, the Cheshire County Medical Society and the New Hampshire Medical Society.

His widow, his mother and two brothers survive him.

MARKS—HOMER H. MARKS, M.D., of Berlin, was fatally injured on April 11 when he stepped into an old elevator well at the St. Louis Hospital in Berlin.

Born in Portland, Maine, in 1876, Dr. Marks graduated from Bowdoin Medical School in 1906. He was associated with the Mayo Clinic in Rochester, Minnesota, for several years.

Dr. Marks was a member of the Coos County Medical Association, the New Hampshire Medical Society and the American Medical Association.

Survivors are his widow, a son, and a daughter.

CORRESPONDENCE

HYPERTENSIVE HEART DISEASE

To the Editor: In the article, "The Development of the Concept of Hypertensive Heart Disease," by Drs. David Davis and Max J. Klainer, the statement appears, "In this country, Fahr was one of the first [1923] to appreciate the clinical significance of hypertensive heart disease."

The earliest worker in this field, if not the first, to mention, emphasize and reiterate the effects of arterial hypertension on the heart was Theodore C. Janeway (1872–1917). He mentioned it first in his book, *The Clinical Study of Blood Pressure* (1904). He reiterated it in 1906 (The diagnostic significance of persistent arterial pressure. *Am. J. M. Sc.* 131:772–778, 1906), and re-emphasized it in 1912 (A study of the causes of death in 100 patients with high blood pressure. *J. A. M. A.* 59:2106–2110, 1912). His finest report on hypertensive heart disease, one that may be pointed to without question as the classic treatise on the subject, appeared in 1913 (A clinical study of hypertensive cardiovascular disease. *Arch. Int. Med.* 12:755–798, 1913).

For reasons which are too extensive to consider here, but which are discussed by me elsewhere (Janeway on hypertension. *Bull. Hist. Med.*—in press), the excellent work by Janeway on the subject has frequently been overlooked and underestimated. I hope that this short note will aid in calling attention to his fine contributions on essential hypertension and hypertensive heart disease, which he so richly deserved.

The present war reminds us of his untimely demise. In the late autumn of 1917, after having had the general direction of the Division of Internal Medicine of the United States Army as his important assignment, Janeway made a personal investigation of the outbreaks of measles and pneumonia at certain cantonments. This, in addition to the energy required for the work at the office of the Surgeon-General in Washington and the biweekly clinics in Baltimore at Hopkins, weakened his power of resistance. Toward the end of December he became ill and after less than one week's illness of pneumonia, died at his home in Baltimore on December 27, 1917, at the age of forty-five. He was the first full-time professor of medicine at Johns Hopkins University School of Medicine under the William Welch Endowment, and served in this capacity from 1914 until his early death in 1917.

NATHAN FLAXMAN, M.D.

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REPORTS OF MEETINGS

GREATER BOSTON MEDICAL SOCIETY

A regular meeting of the Greater Boston Medical Society was held at the Beth Israel Hospital on March 4, with Dr. Aaron Thurman presiding. Dr. Ernst P. Boas, of Columbia University College of Physicians and Surgeons, spoke on "Factors That May Induce Cardiac Infarction." It was stated that in this condition, suggest-

nons for further clinical and laboratory studies should be the result of clinical observations.

Dr Boas discussed first the relation of chest trauma to coronary thrombosis. That thoracic blows may be sufficient to induce heart attacks has been accepted, but the mechanism is still uncertain. There may be either direct injury to the myocardium or an indirect effect on the coronary vessels through pressure from hemorrhage.

The relation of exertion to coronary infarction has been a constant source of discussion in medicolegal as well as medical circles. Dr Boas cited several cases of angina pectoris or coronary thrombosis occurring originally with or concomitant to unusual or sudden physical stress. Angina pectoris may definitely be inaugurated at the time of sudden exertion, and may persist while the patient continues to work. As to whether this may be considered a cause for disability, Dr Boas suggested that each case must be considered separately. It is believed that physical exertion may be a definite cause of coronary attacks, especially if the signs and symptoms are immediately noted. Although the subsequent onset may be suggestive when occurring within a few hours or days, one cannot be sure in such cases. In some states, the onset must accompany an unusual effort or accident.

The well known relation of emotion to coronary thrombosis and angina pectoris is a clinical observation for which there has been no adequate explanation. Sudden death may result from ventricular fibrillation following a sudden outpouring of adrenaline, or a temporary relative myocardial ischemia would make this analogous to physical effort.

Although the causative relation of allergic conditions to coronary artery disease is still controversial, there now appears to be definite evidence in favor of such a connection. That similar changes occur during anaphylactic shock in animals and in angioneurotic edema has been demonstrated. Occasional cases of anginal attacks have been observed in the process of desensitizing allergic patients, and the role of nicotine in inducing coronary changes is not unusual. Reversible changes in the electrocardiogram are present during certain asthmatic attacks.

The effect of cold has often been investigated and it has been found that cooling from any cause may induce coronary attacks, possibly by reflex coronary artery spasm. Dr Boas believes that cold weather and snow definitely increase the incidence of heart attacks. The immersion of the hands of a susceptible person in ice water may induce immediate inversion of the T wave of the electrocardiogram and may cause a coronary attack.

Certain other conditions that may contribute to coronary artery accidents are gripe and other debilitating diseases, postoperative states, hemorrhage and shock, sunstroke, electric shock, high altitudes with incident anoxia, and excessive heat and humidity. Physicians may often scoff at these external factors, yet they invariably warn against them in practice. The most plausible explanation for coronary occlusion and myocardial infarction seems to be that arteriosclerosis narrows the available vascular channels and that reflex spasm may cause a similar temporary diminution of blood flow. Under these conditions such external factors which would have no effect on a normal heart and coronary system are sufficient to cause a temporary or permanent impairment of myocardial nutrition, with subsequent signs and symptoms of coronary thrombosis or angina pectoris.

The discussion was opened by Dr Herman L. Blum, M.D., of the Beth Israel Hospital, who stated that although he had no fundamental disagreement with the

thesis of Dr Boas, he believed that everyone puts some additional burden on the heart every day or week, which might well inaugurate a coronary attack. It is only when definite signs of immediate myocardial insufficiency are manifest that one is justified in assigning any causative role to the exertion. Many of Dr Boas's clinical observations have been corroborated at the Beth Israel Hospital, where experiments have been carried out on exercise in cold rooms and in warm rooms with ice cubes in the patients' hands. It was stated that careful questioning usually elicits a definite coronary background in most cases of attacks induced by external factors except direct trauma.

Dr Samuel A. Levine, of the Peter Bent Brigham Hospital, discussed coronary artery disease under the headings of predisposing and precipitating factors. Of the former, all that is known concerns the definite role of heredity, sex and any disease with atherosclerosis—such as diabetes, myxedema, gout and thromboangiitis obliterans. The male sex predominates 3:1 in general, and 24:1 under forty years of age. Among the precipitating factors, effort easily leads in importance. Since the average person spends twenty times as much time sleeping or resting as in an active state, the incidence of heart attacks, which is twice as large while at rest as while exercising, indicates that when a correction is made effort surely plays an important role. Dr Levine believes that although immediate exertion is undoubtedly harmful, subsequent graded effort may be helpful, probably by reestablishing an adequate auxiliary circulation. The inadvertent intravenous use of adrenalin has been known to cause coronary occlusion, and it was suggested that one act accordingly rather than wait for convincing proof that in outpouring of adrenaline is harmful.

The next discussor was Dr Samuel H. Proger, of the Joseph H. Pratt Diagnostic Clinic, who emphasized that the unusual cases in which exertion in convalescent cardiac patients is not harmful should not lead one to adopt that as a standard or even advisable form of treatment. Whether angina pectoris is followed in a large percentage of cases by coronary thrombosis is apparently dependent on the astuteness of the questioning physician, as shown by a comparison of statistics from clinic patients and from private patients of reputable cardiologists. It was stated that the finding of unexplained rapid sedimentation rates in suspected cases may presage a coronary attack by weeks or months and that such findings are not common.

Dr Monroe J. Schlesinger, of the Beth Israel Hospital, reminded the group that coronary artery disease is a question of supply and demand. In regard to compensation, he pointed out that the same job day in and day out is not the same job, for it is being done by a different man. A gradually decreasing coronary supply with increasing age is a physiologic fact. Furthermore, the degree of unpreparedness probably plays a part in determining the ill-effects of unusual or sudden effort.

The discussion was closed by Dr Boas who suggested that preceding coronary artery disease is probably invariably present despite the lack of clinical manifestations. He is of the opinion that bedrest should be urged for as long as possible, and he advises four to six weeks even in so-called favorable cases. The addition of infarction may be of benefit to the patient by eliminating the infarcting artery. Enforced rest as obtained in arthritis and cerebral vascular accidents aids in diminishing coronary attacks. The danger of ingesting large meals was emphasized. Finally, Dr Boas stated that at least part of the apparent increase of coronary disease is due to better diagnosis.

BOSTON ORTHOPEDIC CLUB

At a regular meeting of the Boston Orthopedic Club on March 17, Dr. Philip D. Wilson spoke on "Recent Experiences in England." In introduction, Dr. Wilson reviewed the background for the American Hospital in Britain. He then went on to discuss the four kinds of explosives used by the attacking forces and their different effects on property and human beings. Several patients were admitted without obvious external injuries and poorly understood neuromuscular derangements. One group developed a peripheral paralysis similar to that of poliomyelitis except in its rapid clearing. Another group developed paraplegia, which also ran a short self-limited course.

Air-raid defense was briefly discussed. Experiences in the recent Spanish War proved the advantages of using bomb shelters more generally and of making more adequate shelters when possible. Although they are often inadequate, the shelters in England usually protect against any but direct hits. The subways, which originally were not supposed to be used and in which the hygienic conditions were at first atrocious, are now being rather generally employed as shelters, and the government has made surprisingly rapid and effective improvements. Whereas the workers formerly used the shelters quite often, it is now considered not only patriotic but practically as safe to continue their commuting and work with only temporary intermissions at the most. Day-time raids at best have been ineffective. Antiaircraft defense, although improving with better and more widespread radio detection, still leaves much to be desired. The new night fighters offer promise for better protection. An important item has been the use of decoy airdromes and hangars to draw enemy fire and thus waste ammunition on barren countrysides. Among the more important defense groups are the bomb demolition squads, who combine ingenuity with courage in finding and inactivating time bombs. It is interesting from a medical standpoint that auscultation is freely used to determine the presence of timing devices within a bomb and that freezing with carbon dioxide is one method of preventing the explosion of chemically constructed bombs.

Medical co-ordination is under the Ministry of Health. An emergency medical service for the development of medical units employs laymen rather than physicians. It is their duty to establish hospitals and evacuate people from danger zones. Unused hospitals and asylums have been reopened and renovated where possible, and some new hut hospitals have been constructed. In London the defense zones are pie-shaped sectors running out from a large medical school or teaching hospital in the city and extending out forty or fifty miles in gradually widening areas. The local doctors are under military orders; their salaries are small but much better than could be obtained from the poor practices that are now possible.

The American Hospital in Britain has its headquarters in an old asylum that is well heated but has comparatively poor surgical facilities. There are 1500 beds, of which 300 belong to this group. There is a large British staff, with three surgical services. This institution is the base hospital for three sectors and the evacuation center for southeastern England, especially Portsmouth and Southampton. A good supply of fresh blood, liquid plasma and dried serum is available. Those admitted to the hospital consist of two groups: any uniformed man—these make up about two thirds of the total—and civilians who are injured by the enemy, injured in civilian defense or have been under treatment in a hospital evacuated because of enemy bombs.

The type of work done by the general surgeon is largely hernias, interval appendectomies and vascular operations. The plastic surgeons, under Gillies, have been especially concerned so far with aviators, whose hands and faces are apt to be severely burned in escaping from burning planes. It has been found that tanning of these areas does more harm than the burns themselves. This is especially true of the hands, where the eschar interferes with the circulation. It also has a tendency to require too long immobilization of the hand and face muscles. The neurosurgical service has thus far been relatively inactive. The orthopedic service, on the other hand, has been busy treating fractures and other injuries, including those of many survivors of the Battle of Dunkirk.

During raids, patients are brought to first-aid centers by ambulances and are admitted by the senior surgeon for appraisal and decision about the type of treatment. The first group of patients, classified as urgent, are treated for shock with plasma and intravenous fluids. There are always one or two teams in the shock room. The second group, considered capable of immediate operation, are sent to the operating rooms after x-ray examination. Their wounds are débrided, and sulfonamides are usually employed locally. The majority of wounds are packed open, primary suture being carried out only when the patient can be followed by the original operator for the next seven to ten days, which is very unusual. The Thomas splint is being employed less than previously. There is now a definite trend toward the Orr method. There is often poor apposition of fragments, and the original fixation must be changed when the base hospital is reached. The third group consists of those with minor wounds, which are dressed; these patients are then sent to the wards.

It is characteristic of the wounds that there is a great prevalence of shock without obvious blood loss. Clinical judgment has largely supplanted determinations of blood pressure, protein levels and hematocrit readings in evaluating the status of a patient. In the surrounding countryside, emergencies are only too often seen by inexperienced men in small towns whose treatment is often ill-advised. In any questionable case of shock the patient should be established in the shock room, and the problem of infection should be only a secondary consideration.

The patients arrive at the base hospitals from a few days to several weeks after the original injury. The wounds are usually grossly infected, and it is too late even to consider surgical cleansing. Most wounds are multiple because of the multitude of secondary projectiles. The wounds are usually small on entrance and comparatively large on exit. Gas-bacillus infection is very common, but gas gangrene has been infrequent. Many wounds that have been inadequately treated must be left alone because of the danger of increasing or causing a flare-up of infection. About two thirds of all patients required revision of their original orthopedic result. They are taken to the operating room, where the wounds are opened under general anesthesia, sulfathiazole in doses of from 5 to 7 gm. being introduced into the wound. This drug is usually administered orally on the succeeding days. Because of the high incidence of comminution in the fractures, traction is usually necessary following reduction. For this purpose the Roger-Anderson or Haynes apparatus has been widely used.

Comparison was made with treatment of similar wounds in the last war. The patients do very well on the whole, with only moderate elevations of temperature for a few days. Symptoms are usually employed as the indications for changes in therapy, and the drug dosage is controlled

by blood level determinations. Pain and anxiety are largely absent, compared with patients treated by the Carrel-Dakin method, there is much less work for the medical staff, and better continuous position of the bone fragments. Under the present regimen, only 2 of 90 patients required daily dressings, and these were minor enough to be carried out by nurses. Dressings are not changed for about a month unless absolutely necessary. The odor naturally becomes very strong, but fortunately the British like the open air, and new charcoal bags are being used to absorb a large part of the smell. The first dressing is carried out under general anesthesia without any disturbance of traction.

The end results, even including cases of gas infection, compare favorably with those of the last war. It is believed that chemotherapy probably has a good local bactericidal effect. Serum has been used only on occasion, but it is thought that combined therapy is undoubtedly the best for gas-bacillus infection. If crepitation is present without gangrene, the area is incised and treated like the other wounds. There has been only one amputation, which is a marked improvement, although there may be others later. Success is attributed to the local rest afforded the wound, which favors local tissue defense, the constant pressure, which aids the circulation and especially the absence of contamination. For it is now known that hospital infection is altogether too high especially where many daily infected dressings are done. It has been shown experimentally that merely turning back the sheet over an infected wound will cause a heavy growth of the pathogenic organisms on Petri dishes placed within twenty five feet of the bed.

Unsolved problems consist of persistent osteomyelitis and delayed union or nonunion. But even if later amputations are necessary, they become elective rather than emergency measures. Nerve injuries subsequent to sinus tracts often hinder therapy, and it has been found best to do a wide resection of the infected area, with later repair of the nerve and bone grafts.

Erratum In the report of a meeting of the Harvard Medical Society, contained in the May 15 issue of the *Journal*, the phrase 'a guanidine compound' in line 36 of the second column on page 874, should read 'a pyrimidine compound (sulfadiazine)'.

NOTICES

JOHN T. BOTTOMLEY SOCIETY

The regular monthly meeting of the John T. Bottomley Society will be held in the Out Patient Department Building of the Carney Hospital on Tuesday, June 3, at 11:30 a.m. Drs. Timothy F. Lyons and Charles H. Dustin will speak on 'Intestinal Intubation'.

Physicians and medical students are cordially invited to attend.

NORFOLK SOUTH DISTRICT MEDICAL SOCIETY

The annual dinner outing of the Norfolk South District Medical Society will be held at the South Shore Country Club on Wednesday, June 11. There will be an afternoon bridge and tea for the ladies and golf for the doctors. Dinner will be served at 7 p.m. followed by an entertainment.

EXAMINATIONS FOR APPOINTMENTS IN THE MEDICAL CORPS OF THE UNITED STATES NAVY

The next examination for appointments as assistant surgeon (lieutenant, junior grade), United States Navy Medical Corps, will be held at all major Medical Department activities on August 11 to 15, inclusive. Applications for this examination must be received at the Bureau of Medicine and Surgery, Navy Department, Washington, D. C., not later than July 15.

Applicants for appointment as assistant surgeon must be citizens of the United States, more than twenty-one but less than thirty-two years of age at the time of acceptance of appointment, and graduates of a Class A medical school who have completed at least one year of intern training in a hospital accredited for intern training by the Council on Medical Education and Hospitals of the American Medical Association.

A circular of information listing physical and other requirements for appointment, subjects in which applicants are examined, application forms and other data pertaining to salary, allowances and so forth may be obtained from the Bureau of Medicine and Surgery on request.

An examination for appointment as acting assistant surgeon for intern training in naval hospitals accredited for intern training by the Council on Medical Education and Hospitals of the American Medical Association will be held at all major Medical Department activities on June 23 to 26, inclusive. Students in Class A medical schools who will complete their medical education this year are eligible to apply for these appointments, and if successful will receive their appointments approximately after the date of the examinations. Students in Class A medical schools who will have completed their third year of medical education this year are eligible to take this examination, and if successful will receive their appointments on or about July 1, 1942, after they have completed their medical education.

Applicants for appointment as acting assistant surgeon for intern training must be citizens of the United States, more than twenty-one but less than thirty-two years of age at the time of acceptance of appointment. Acting assistant surgeons are appointed for a period of eighteen months. After the appointee has served as an intern in a naval hospital for twelve months, he is eligible for and may take the examination for appointment as assistant surgeon.

A circular of information listing physical and other requirements for appointment as acting assistant surgeon, subjects in which applicants are examined, application forms and so forth may also be obtained from the Bureau of Medicine and Surgery on request.

Assistant surgeons and acting assistant surgeons for intern training are appointed in the rank of lieutenant (junior grade), United States Navy Medical Corps. The pay and allowances for an officer of this rank total \$2699 per year if he has no dependents, and \$3158 per year if he is married or has dependents.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, JUNE 1

MONDAY, JUNE 2
12:15-4:15 p.m. Clin. copathological conference. Peter Bent Brigham Hospital amphitheater.

TUESDAY, JUNE 3
• 11:30 a.m. Intest. Intubation. Drs. Timothy F. Lyons and Charles H. Dustin. John T. Bottomley Society. Out Patient Department Building, Carney Hospital.

12:15-1:15 p.m. Clinicorontgenologic conference. Peter Bent Brigham Hospital amphitheater

WEDNESDAY, JUNE 4

*12 m. Clinicopathological conference. Children's Hospital.

THURSDAY, JUNE 5

7:15 p.m. Lecture on Cancer. Dr. Herbert L. Lombard. New England Hospital for Women and Children.

*Open to the medical profession.

MAY 30, 31 — American Heart Association. Hotel Statler, Cleveland.

MAY 30-JUNE 2 — American College of Chest Physicians. Hotel Statler, Cleveland.

JUNE 2 — American Medical Golfing Association. Page 785, issue of May 1.

JUNE 2-6 — American Medical Association. Cleveland.

JUNE 2-6 — Woman's Auxiliary, American Medical Association. Hotel Carter, Cleveland.

JUNE 4 — Harvard Medical Alumni Association. Page 790, issue of May 1.

JUNE 22-24 — Maine Medical Association. Marshall House, York Harbor, Maine.

OCTOBER 13-24 — 1941 Graduate Fortnight of the New York Academy of Medicine. Page 834, issue of May 8.

OCTOBER 14-17 — American Public Health Association. Page 579, issue of March 27.

DISTRICT MEDICAL SOCIETY

NORFOLK SOUTH

JUNE 11 — Page 961.

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

Introducing Insects: A book for beginners. By James G. Needham, Ph.D. 12°, cloth, 129 pp., with 86 illustrations. Lancaster, Pennsylvania: The Jaques Cattell Press, 1940. \$1.50.

Man on His Nature. By Sir Charles Sherrington, O.M. The Gifford Lectures, Edinburgh, 1937-8. 8°, cloth, 413 pp. New York: The Macmillan Company, 1941. \$3.75.

Proctology for the General Practitioner. By Frederick C. Smith, M.D., M.Sc. (med.). 8°, cloth, 466 pp., with 161 illustrations and 5 colored plates. Philadelphia: F. A. Davis Company, 1941. \$4.50.

The Periodicity and Cause of Cancer, Leukæmia and Allied Tumours, with Chapters on Their Treatment. By J. H. Douglas Webster, M.D., F.R.C.P.E., F.F.R., honorary director, Meyerstein Institute of Radiotherapy, Middlesex Hospital, London, lecturer and examiner in radiology, University of London, and examiner in radiotherapy, Faculty of Radiologists, London. 8°, cloth, 178 pp., with 5 plates, 8 charts and 8 tables. Baltimore: Williams and Wilkins Company, 1940. \$3.50.

A Laboratory Manual of Physiological Chemistry. By D. Wright Wilson, Benjamin Rush Professor of Physiological Chemistry, University of Pennsylvania. Fourth edition. 8°, cloth, 298 pp. Baltimore: Williams and Wilkins Company, 1941. \$2.50.

BOOK REVIEWS

Chirurgie réparatrice et correctrice des téguments et des formes. By L. Dufourmentel. Preface by Professeur Pierre Sébileau. 8°, paper, 408 pp., with 451 illustrations. Paris: Masson et Cie, 1939. \$3.00.

The author has been well known for his work in reparative and plastic surgery since World War I. In this volume, he has embodied his methods of approach to various deformities of the face. He has not attempted to deal with the treatment of other parts of the body, except corrective surgery for hypertrophied breasts. War injuries, as well as civilian injuries, are covered, which is of great importance at this time.

In the first chapter, the author discusses general methods of repair, and gradually elaborates the surgical technique applied to various structures of the face. The chapter on deformities of the nose is more fully covered than those of the eyelids, ear and lips. The discussion of the repair of war injuries is interesting and has historical value, but the results obtained do not measure up to the present standards of reconstructive surgery. Reparative surgery has made much progress in the last twenty-five years and better results may therefore be expected in the repair of fractures and war injuries.

On the whole, there is much that is well discussed and instructive. The author's style is simple and direct, and the illustrations are abundant and clever. It is a valuable contribution to the literature of reparative surgery of the face, and will interest those who are in this branch of surgery, as well as those in general surgery.

The Chronicle of Crichton Royal (1833-1936). By Charles Cromhall Easterbrook, M.D., F.R.C.P. (Eng.). With a foreword, "Some Early Crichton Memories," by the late Sir James Crichton-Browne, M.D., LL.D., F.R.S. 4°, cloth, 663 pp., with 103 illustrations and 1 map. Dumfries, Scotland: Courier Press, 1940. 25 sh. net.

This large book is a detailed history of one of the famous mental hospitals in Scotland, covering a period of over one hundred years. The first report of the hospital was issued in 1840. The founder was James Crichton, who studied at the University of Edinburgh, and while still a youth went to India, in the service of the East India Company. He became physician to the Viceroy, but also found time to make a fortune by trading in India and in China, and returned to Scotland in 1808, when only forty-three years of age, a rich man. It was with this fortune that he endowed the Crichton Royal Institution, a hospital staffed with the best of Scottish physicians for over one hundred years. The book is fully illustrated with photographs and portraits, and there is an extensive index. It forms a record of enduring work.

A Handbook of Hearing Aids. By A. F. Niemoeller, A.B., M.A., B.S. Foreword by Harold Hays, M.D. 8°, cloth, 156 pp. New York: Harvest House, 1940. \$3.00.

This is a description in nontechnical language of the different types of hearing aids and the methods of using them to best advantage. At the end of the book, there is a complete list of hearing aids and the companies that manufacture them. This book should be in the office of all otologists who are interested in treating the deaf and aiding them by means of hearing apparatus.

The New England Journal of Medicine

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VOLUME 224

JUNE 5, 1941

NUMBER 23

CESAREAN SECTION IN MASSACHUSETTS IN 1939*

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BOSTON

THE following report on cesarean sections performed in Massachusetts in 1939 is the third in the five-year study.[†] Three additional questions were included in the questionnaire this year—the name of the consultant, the name of the operator and the birth weight of the baby.

The questionnaires were sent to one hundred and seventy-two licensed maternity hospitals, and replies were received from all but two. One hospital had been closed, and the records were not available. How many cesarean sections were done in this hospital is not known. It was found, however, that in 1 cesarean section done there the patient died after transfer to another hospital. The other that did not reply was a small hospital that had changed ownership. Its records were not available. In forty-two small hospitals, no cesarean sections were performed.

* * *

In Massachusetts in 1939 there were 62,575 live births and 1765 stillbirths, a total of 64,340. Of these, 52,697 were reported to us as having occurred in hospitals. There were 1984 cesarean sections performed and 12 hysterectomies, a total of 1996 abdominal deliveries, or an incidence of 1 in 32.2, compared with 1 in 30.3 in 1937 and 1 in 28.7 in 1938.

Table 1 gives a summary of the abdominal deliveries. The only significant change in this table is the marked increase in the number of sections of the extraperitoneal type. There were 20 in 1937 and 14 in 1938, compared with 34 in 1939. The reason for this increase is the new operative technic developed by Dr. Waters. There were 31 cases of the Waters type, 1 of peritoneal exclusion and only 2 of the Latzko type.

A short analysis of these 34 cases is interesting. Of the 31 patients on whom the Waters operation

was performed, 17 made uneventful recoveries. Of these, however, 4 were not in labor, nor were the membranes ruptured; the operators obviously wished to try out the new technic. Of the 13 remaining cases of uneventful recovery, 7 patients

TABLE 1. Summary of Abdominal Deliveries.

OPERATION	No. OF CASES 1939	No. OF CASES 1938
Cesarean section		
Emergency	921	
Elective	1059	
Not reported	4	
Type of operation		
Low	1003	
Classic	898	
Latzko or extraperitoneal	33	
Peritoneal exclusion	1	
Porro	26	
Not reported	23	
In labor	616	
Not in labor	1302	
Not reported	66	
Membranes ruptured	313	
Membranes unruptured	1600	
Not reported	71	
Hysterectomy		12
Total		1996

had unruptured membranes, and 4 of these were in labor only eight to fourteen hours. The remaining 3 had labors of twenty-five, forty-eight and seventy-two hours. Of the 6 patients with ruptured membranes, 4 were in labor twenty-eight to thirty-six hours, with membranes ruptured from ten to thirty-two hours. One was in labor thirteen hours, with membranes ruptured twelve hours, and at operation a large hydrocephalic baby weighing 11 pounds, 5 ounces was delivered. In the last case in this group, forceps delivery was attempted twice but failed. This case I shall discuss later.

In the remaining 17 cases with the extraperitoneal type of operation, 2 patients died, and the others were reported as having had febrile convalescences. This group includes the 2 Latzko operations, the peritoneal exclusion and 12 of the Waters type. The answers to the questionnaires do not give the complete picture of these cases, and it is not fair to comment too harshly without

*Read before the Fall River Medical Society, January 25, 1941, and before the Boston Obstetrical Society, February 18, 1941.

[†]The other two were published in the December 1, 1938, and July 11, 1940 issues of the *New England Journal of Medicine*.

further study. I record the summary of the analysis. The 2 patients that died, both following Waters operations, I shall refer to later under maternal deaths.

One patient on whom a Latzko operation was performed was in labor for thirty-six hours, with membranes ruptured for forty-eight hours. She is reported to have had a temperature on entrance to the hospital. She had a stormy convalescence, with a fever during her entire stay in the hospital, and was finally discharged from the hospital with a draining wound. The other patient on whom a Latzko operation was done was in labor, with ruptured membranes for eighteen hours. She had distention and fever for some days, but was discharged well. Both babies were discharged well. At birth they weighed respectively 7 pounds, 2 ounces, and 6 pounds, 14 ounces.

In the peritoneal exclusion case, the patient was in labor sixteen hours, with ruptured membranes ten hours. The baby was presenting by the breech and was delivered alive. The only note made on this case was that the convalescence was febrile.

The 12 cases of the Waters type of section that had febrile puerperiums remain to be analyzed. Two patients were not in labor, and the membranes were not ruptured. Of the remaining 10, 4 were in labor from twelve to twenty-three hours, and 6 from twenty-four to forty-eight hours. Of these 10 cases, in 1 the membranes were not ruptured, in 1 they were ruptured less than eleven hours, in 5 from twelve to twenty-three hours, in 2 from twenty-four to forty-seven hours, and in 1 forty-eight hours. The type of labor is not recorded in all, but in several it was noted to be only fair or poor, and in a few it was reported to have been hard.

The following complications were reported as occurring in these 12 patients. Two developed bronchopneumonia, and 1 a so-called "upper respiratory infection." Three developed pyelitis. One was reported as having septicemia, pneumonia, pulmonary embolus and empyema, and was transfused twice. Another was reported as septic, developing a pelvic phlebitis, pyelitis and embolus, and was twice transfused. Another, reported as having a febrile puerperium with endometritis, had an embolus. One is reported as having had a stormy convalescence, which was never serious. The 2 final cases were simply reported as septic. In this group, all the babies lived.

The number of Porro operations performed—26—is approximately the same as that in the two previous reports. Two of the 26 patients died. There is no need to analyze all the indications for these Porro operations, since they will be taken

up later under the various indications for operation. There are, however, several that should be commented on here, because they might otherwise be overlooked. In 4 cases no recorded indication is given in the questionnaires. In 1 of these cases a Porro operation was done after a twelve-hour test of labor with a breech presenting. The baby weighed 6 pounds, 8 ounces. Two other cases were repeat elective sections. The fourth operation was done on a forty-four-year-old primipara following a twelve-hour labor, and a contraction ring was found. The baby in this case was stillborn. A thin scar of a previous section was the recorded indication for 1. In 1 case a branch of the uterine artery was torn at the

TABLE 2. *Indications for Hysterotomy.*

INDICATION	No. of CASES
Cardiac disease	5
Hypertension	2
Nephritis	1
Manic-depressive insanity	2
Hereditary chorea	1
Increasing toxemia	1
Total	12

cesarean section, and a Porro operation was done at once. In another case, an elective repeat section, the uterus continued to bleed, and a Porro was thought to be indicated. The baby in this case weighed but 5 pounds.

The final case in this group on which I wish to comment is that of a patient with membranes ruptured fourteen hours, in labor twelve hours. It is recorded that free pus was found in the uterus, yet the patient made an afebrile convalescence. The baby weighed 11 pounds, 8 ounces, and died on the eighth day. At autopsy both kidneys showed free pus.

Table 2 shows the indications for the 12 hysterot-

TABLE 3. *Types of Anesthesia.*

ANESTHETIC	No. of CASES
Nitrous oxide, oxygen and ether	1255
Ether	194
Cyclopropane	136
Spinal	185
Nitrous oxide and oxygen	18
Avertin, and nitrous oxide, oxygen and ether	29
Local	22
Other	135
Not reported	10
Total	1964

omies. These are clear, and no comment is necessary.

Table 3 records the types of anesthesia. The use of spinal anesthesia has increased slightly, and the use of cyclopropane has dropped. The others remain in relatively the same proportion. Un-

der the heading "Other" are grouped various combinations that were used and some of the newer anesthetics. Two deaths apparently must be assigned to anesthesia, and they will be reported under the maternal deaths.

Table 4 shows the reported indications for operation in cases in which the baby died. Although

TABLE 4 Indications for Operation in Cases with Death of the Baby

INDICATION	EMERGENCY CESAREAN SECTION	ELECTIVE CESAREAN SECTION
Separated placenta	33	1
Placenta previa	4	3
Toxemia and nephritis	5	
Previous cesarean section	10	2
Prolonged labor	1	
Contracted pelvis	1	
Ruptured uterus	2	
Previous operative attempts	1	
Desire of patient		1
Eclampsia	3	
Test of labor	5	
Previous disaster	1	
Cardiac disease	1	
Pylitis	—	1
Diabetes	—	2
Amputation of cervix	—	1
Malignancy	—	
Hydrocephalus	—	1
Anencephalus by x ray	—	1
Hydranmios	—	1
Elderly primipara	1	
Disproportion	1	
Breech	1	
Tonic uterus	1	
Surgical emergency	1	
Bleeding	1	
Obstructing tumor	1	
Not reported	1	
Totals	174	49

the actual number of babies lost is lower, the percentage is slightly higher than that in 1938.

It is difficult to tell from the questionnaires in how many of these sections the first two indications in Table 4 were for the best interests of the patients. Undoubtedly many were questionable, for some were done at five or six months' gestation, and in many of the previas the babies' weight was reported to be 4 pounds or less. One such patient, on whom a Porro was done, is reported as having moderate bleeding at six months.

Under "Toxemia and nephritis," 12 babies were lost. There is always a serious risk to the babies in these cases, and the loss of 12 is not surprising. It is only by careful prenatal care that the number and severity of the toxemias can be reduced, and so long as such care is not given deaths from this cause will continue.

Thirty-two babies were lost following cesarean section done because of a previous section. Of the 10 classified under "Emergency," 3 were lost because of ruptured uterus, 3 because of premature labor, — the babies weighing less than 5 pounds, — 2 because of separated placentas, — 1 of these babies being macerated, — 1 because of erythroblastosis

and 1 because of alleged congenital heart disease, although no autopsy was performed.

In the elective repeat sections, 22 babies were lost. The cause of 7 of these deaths was atelectasis or prematurity; 4 infants had malformations incompatible with life, 2 died from erythroblastosis; 2 died from toxemia; 2 were stillborn, 1 of these being macerated; 1 each died from hemorrhagic disease of the newborn, cerebral hemorrhage and congenital heart disease; and 2 died from complications arising after birth, 1 from abscess of the lung and 1 from bronchopneumonia.

It is obvious that some of these deaths were unavoidable, but unless all the 32 original cesarean sections were necessary, through the repeat sections the patients were subjected to an operative procedure that failed to give a living baby.

It is difficult to explain why the babies were lost in many of the elective sections. It seems hardly reasonable to perform a section on a known malformed fetus, and it is a doubtful procedure on a patient presenting hydramnios.

As in the elective sections, some of the emergency deaths were unavoidable. But the loss of so many babies shows conclusively that the choice of a cesarean section in some cases was, to say the least, questionable. It must be recorded that in 4 of the emergency sections the fetus was macerated. Reasonably good judgment was lacking.

Table 5 shows the indications given for operation. It is arranged approximately as that in the other reports.

There is no need to comment on each indication. Contracted pelvis and disproportion total 336. Of these, 179 were classified as contracted pelvis. One hundred and thirty-seven of the 179 patients had no labor. One baby weighed under 5 pounds, 14 under 6 pounds, 51 under 7 pounds and 61 under 8 pounds—a total of 127 babies of average size. One woman said to have had a large baby was operated on and delivered of twins. There were 39 babies weighing over 8 pounds, and 12 cases in which the birth weight was not recorded. One hundred and fifty-seven cases are classified under "Disproportion." Seventy-four of these had no labor, and a section was done presumably because the operators regarded the babies as too large for a normal delivery from below. Analysis of the weights of the babies shows 2 under 5 pounds, 2 under 6, 21 under 7 and 57 under 8 pounds. Seventy babies weighed 8 pounds or over, and in 5 cases the birth weight was unrecorded.

Under the indication "Contracted pelvis," 82 cesarean sections were done without consultation, but under "Disproportion," there were only 40.

Farther down in the list of indications, 164 cases are classified under "Test of labor." In these, 1 baby weighed under 4 pounds, 1 under 5, 4 under 6, 23 under 7 and 47 under 8 pounds. There were 74 weighing 8 pounds or over, and in 14 cases the weight was not reported.

If the number of babies weighing under 7 pounds in these 3 indications are added together, the total is 120, or 24 per cent of the 500 cesarean sections

labor under twelve hours, 2 from twelve to twenty-three hours, 13 from twenty-four to forty-seven hours, 3 from forty-eight to seventy-two hours, and in 2 the length of labor was not reported. In this group, 4 babies were lost and there was 1 hydrocephalic case. Six of these women developed severe puerperal sepsis, but all, fortunately, recovered. Seven of the babies weighed under 7 pounds, and 1 of these was under 6. Several of the babies

TABLE 5. *Indications for Cesarean Section.*

INDICATION	NO OF CASES	INDICATION	NO OF CASES
Previous section	608	Multiple sclerosis	1
Contracted pelvis and disproportion	336	Pyelitis	2
Placenta previa	215	Chronic nephritis	6
Separated placenta	86	Previous obstetric disaster	52
Toxemia	78	Elderly primipara	58
Eclampsia	11	Obstructing tumors (fibroids)	24
Malposition of baby	79	Fetal distress	6
Breech	50	Protruded cord	4
Transverse	21	Following operative attempts	7
Brow	2	By request or for sterilization	10
Face	6	Request	9
Dystocia	220	Sterilization	1
Dystocia	9	Ruptured uterus	8
Labor without progress	23	Spontaneous	2
Test of labor	164	Previous section	6
Cervical dystocia	24	Bicornate uterus	1
Previous surgical operations	36	Postmaturity	3
Repair of perineum	13	Malformation of fetus	4
Amputation of cervix	9	Malformation of vagina	1
Repair of cervix	5	Error in diagnosis	1
Myomectomy	4	Surgical emergency	1
Pelvic surgery	3	Bizarre	32
Repair of fistula	2	Not reported	52
Associated medical conditions	51	Total	1984
Cardiac disease	24		
Tuberculosis	2		
Diabetes	16		

performed. But the total number of babies under 8 pounds is 285, or 57 per cent of the number of sections done for these three indications. There can be but one conclusion from these figures: that a large number of the sections are totally unjustified.

I have already spoken about the questionable procedure of performing sections on some of the patients with placenta previas and separated placentas.

There has been a marked drop this year in the number of sections for toxemia, but the number for eclampsia remains about the same. In the 11 cases of eclampsia, 2 mothers and 3 babies died.

Under the indication "Dystocia," there were 9 cases. In 1, labor was mild, and the length was not reported. The other 8 had labors of from thirty-four to seventy-two hours. Two cesarean sections were by the Waters technic, and the others were of the low type. All the babies were discharged well. Five of these patients had febrile puerperiums and for a time gave considerable worry to the operators.

There are 23 cases under "Labor without progress." Two patients were reported as having

that died were not weighed. It is well to note here that all babies should be weighed, whether they are born alive or dead, for comparison in future deliveries.

Twenty-four cases are classified under "Cervical dystocia." In 1 the operation was done before labor began, because of a badly scarred and lacerated cervix. A second was done after eight hours of labor for "cervical atresia." Two of the patients in this group were in labor for two days, 2 for three days and 1 for four days, but the significant remark was made in this questionnaire that the patient had "several bouts of false labor during this time." All the other patients were in labor from eighteen to twenty-four hours, except in 4 cases in which the length of labor was not reported. In 15 cases the membranes were not ruptured. Six of these patients had a febrile puerperium. All the babies were born alive. Six weighed under 7 pounds, and 1 weighed only 3 pounds, 13 ounces. One mother died, and this case will be discussed later.

No comments are necessary on the 36 cases classified under "Previous surgical operations," except to note that following an amputation of

the cervix the section should, if possible, be an elective and not an emergency one

Under "Associated medical conditions" there are 51 cases. It is an interesting fact that because of the control of diabetes by the use of insulin, the number of diabetic patients who become pregnant is increasing. All the mothers and all but 2 babies in this group lived.

No babies died under the indications "Fetal distress" and "Prolapsed cord." In 2 of the latter cases the prolapsed cord was in the first of twins. In 1 of these cases the mother had an extremely stormy convalescence, was septic, developed a phlebitis, but eventually recovered.

In 1 case of "Fetal distress," it was noted that the mother had no labor but that the fetal heart was slow. A section was done, and a baby weighing 5 pounds, 8 ounces was delivered. The heart continued slow, and a diagnosis of congenital heart block is recorded.

Again I regret having to report cesarean sections done following operative attempts at delivery from below. At best it is a dangerous procedure, and should not be attempted unless the previous operative attempts have been made with most meticulous care. The seriousness of this procedure is demonstrated by the fact that 4 mothers and 3 babies died in cases in which operative attempts had failed. The maternal deaths I shall report later in this paper. There is 1 case, however, on which I wish to comment, not as an illustration of good obstetrics but of good luck. After two days of slow, irregular labor, the patient became fully dilated. The head remained high. A forceps was applied by the house officer without success. The visiting surgeon was sent for and the note on the questionnaire says, "With considerable amount of pull, no give for him. Therefore a cesarean was decided on." It is recorded that a Waters type of section was done, and the patient made an uneventful convalescence, the baby weighing 9 pounds, 7 ounces.

Regarding the indication "By request or for sterilization," I can only repeat what I have said so many times before: that to me it is utterly unjustifiable to do a cesarean section simply at the request of the patient or only to sterilize. In 1 section done at the patient's request, the baby was lost. The surgeon who operated must have found it difficult to justify such an operation with the loss of the baby.

Under "Ruptured uterus," 2 spontaneous ruptures were reported and 6 cases in which previous sections had been done. All the mothers lived and 3 babies were born alive. One of these patients had had a longitudinal low flap section in

the first pregnancy, followed by two normal deliveries. In this, the fourth pregnancy, rupture occurred after twenty-four hours of labor, the baby weighing only 5 pounds.

Another interesting case in this group is that of a patient admitted to a hospital in shock. The operator writes:

The ovum was found to be completely in the abdominal cavity and the uterus well shut down with a rupture extending from the left cornu to the region of the cervix on the right side. There was a good deal of amniotic fluid in the sac, which was opened to extract a dead baby. The tear in the uterus was repaired and a drain placed to the pelvis. The patient made an uneventful recovery. She later returned for sterilization.

This case is classified as a spontaneous rupture. The patient had been in labor for two or three days, and had been etherized, but it was reported that she had not been operated on.

Under the indication "Postmature," there is only 1 case on which I wish to comment. The questionnaire states, "Head not in the pelvis, overdue two weeks." A section was done without a consultation, and a baby weighing 5 pounds, 8 ounces, was delivered.

The indication for 4 sections is given as "Malformation of the fetus." Three were hydrocephalic, and 1 was anencephalic. This does not mean that these were the only malformed babies in this series, others occurred, but the malformation was not the primary cause for the section, as in these 4 cases.

Two of these cases, it is recorded, had x-ray examinations. In 1 case the baby weighed 5 pounds, 8 ounces, and as it was being delivered through the incision the head collapsed. The notes on the second case say that "the patient had two premature births at five and six months, and both children died. In view of the x-ray findings and a very large child, it was thought best to do a cesarean section." The weight of this anencephalic monster is not given. In 1 case the baby weighed 11 pounds, 5 ounces, but it is not recorded that an x-ray film was taken. The final case also has no record of an x-ray examination. The baby weighed 7 pounds, 8 ounces, and the patient was operated on after, it is said, three days of labor. She had a pulmonary embolus, which eventually cleared up.

The 1 case of "Error in diagnosis" was that of a general surgeon operating for a large ovarian cyst.

The "Surgical emergency" was the case of a woman brought to the hospital *in extremis*. The abdomen was opened, and pus poured out. The patient had had no previous medical care. The baby was stillborn, and the mother died on the table.

Thirty-two sections were for indications class

sified as "Bizarre." I shall not attempt to enumerate each of these indications, but I do wish to mention a few: "A highly resistant luetic"; "distinct endocrine type"; "severe pain in the right lower quadrant"; "undilatable soft parts" (this patient was not in labor, a cesarean was done, and the baby weighed 5 pounds, 14 ounces); "interlocking twins"; "multiparity." Three sections were done for so-called "dystocia," yet 2 patients had no labor and 1 had labor for only four hours, and the babies weighed respectively 6 pounds, 2 ounces, 5 pounds, 1 ounce, and 7 pounds, 2 ounces. There were 2 cases of cervical dystocia, but the patients had no labor. One baby weighed 6 pounds, 15 ounces, and the other eight pounds. These 2 cesarean sections were done by the same surgeon. It is obvious that he wanted to do a section on the patients. There is no recorded adequate indication. Three patients were said to have a floating head, and were not in labor. One indication was "primary inertia with torsion of the uterus." There was no labor. In

TABLE 6. Summary of 54 Cases with Maternal Death.

DATA	NO OF CASES
Emergency operation	45
Elective operation	9
Type of operation	
Low	24
Classic	26
Porro	2
Waters	2
In labor	29
Not in labor	25
Membranes ruptured	15
Membranes unruptured	39
Babies	
Living	42
Dead	12

a final case the patient was said to have had a previous dystocia in her first labor, but did not go into labor this time. A 6-pound baby was delivered.

It is reported that 68 patients were sterilized at the time of the section.

Table 6 presents a summary of the 54 cases with maternal death. It needs no comment.

In Figures 1 and 2 the data on the maternal deaths are presented in the same manner as in 1938. Figure 1 analyzes the 9 elective sections, and Figure 2 the 45 emergency operations in which death occurred. Some of these cases have already been remarked on. Others need no analysis.

For 1939 there was an encouraging drop in the number of deaths following elective section, only 9 cases being so classified.

Of the 4 deaths giving sepsis as the cause of death, the indication was "contracted pelvis" or "disproportion" in 3 and "repeat section" in 1. This last patient was prepared for operation one

morning, but the membranes ruptured during the night and a section was done within an hour. One patient had a hard operative delivery with the first baby and a large baby in the present pregnancy. She was sterilized following the cesarean section, and the appendix was removed. The operator, a general surgeon, did not ask for a consultation. In this case the sepsis may have originated from the appendectomy. It is a possible cause,

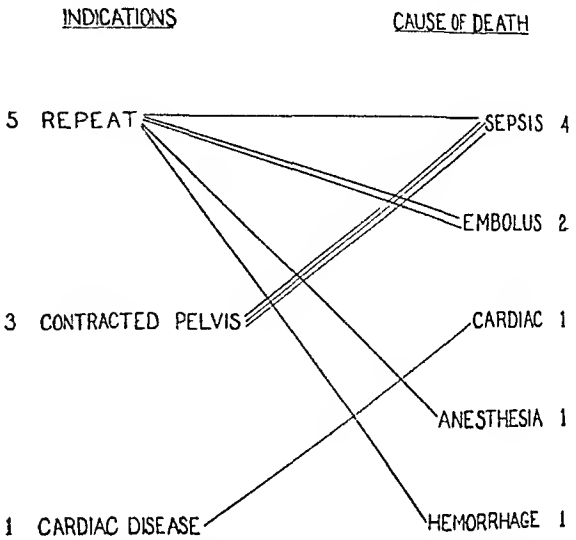


FIGURE 1. Maternal Deaths in 9 Elective Cesarean Sections

and therefore this operation at the time of a cesarean section is always contraindicated.

The third patient was a dwarf with a contracted pelvis. On entrance to the hospital it is reported that she had a temperature of 101°F., with a negative physical examination. Distention occurred in twenty-four hours. The temperature and pulse continued to rise, and the patient died on the morning of the fifth day. The death certificate gave "paralytic ileus" as the cause.

In the final case of sepsis, a staphylococcal bacteremia, section was performed because of a "pelvic outlet smaller than the average." The baby weighed 6 pounds, 13 ounces.

The 2 deaths from embolus were in repeat sections, one occurring on the sixth day and the other as the patient was being helped up the steps to her home on the eleventh day.

The cardiac patient was decompensated, was operated on under local anesthesia, grew steadily worse, and died on the sixth day.

The death assigned to anesthesia occurred in a repeat section. The patient took the anesthetic poorly and had to be resuscitated in the middle of the operation. Twelve hours after operation she developed considerable distention, with a temperature of 102°F. Distention increased, the tem-

perature ranging about 103°F, she died on the sixth day. The death certificate gave bronchopneumonia as the cause of death.

The final death following elective cesarean section occurred in a repeat section three hours after operation. The cause of death on the certificate was "surgical shock, embolus." When the operator attempted to remove the placenta it was found to be an accreta. The patient bled profusely, and a Porro operation was done immediately. Salt solution was given subpectorally at once. While preparations were being completed for

and in spite of intravenous fluids, sulfanilamide and a transfusion, died on the seventh day.

The other 8 cases, not so designated by their physicians, I have placed under sepsis because of the history that was obtained in the maternal mortality study, and they may need explanation. In 4 cases the cause given on the certificate was "paralytic ileus," with or without toxic or acute myocarditis, and in 1 case the cause given was "acute dilatation of the stomach." There can be no question that these 5 deaths should be attributed to sepsis. In 1 case the certificate gave "uremia" as the cause of death. The patient did have suppression of the urine, but she also was septic. Another case gave "toxemia and hemorrhage following a separated placenta" as the cause of death, but from the interview with the physician and from the hospital record the death was definitely thought by the investigator to have been caused by sepsis. In the final case the cause of death on the certificate was "right lobar pneumonia." The evidence in this case is not conclusive, but the facts as brought out by the study are these: After seventeen hours of labor, the cervix being dilated to admit three fingers, a version was attempted on a hydrocephalic baby. It was unsuccessful. One hour later the patient was again etherized, and again the version failed. At this time a ruptured uterus was suspected. The temperature was found to be 104°F, the pulse 140. The patient was then etherized a third time, and a Porro was done because of this ruptured uterus. Death occurred fifty-two hours after operation. There was a suggestion that the patient had an upper respiratory infection on entrance to the hospital, but no temperature was recorded on the questionnaire. She may have died of pneumonia, but I have assigned the death to sepsis. No matter to what cause the death is attributed, it was the result of bad obstetrics.

Of the 7 deaths from shock, 5 followed separated placenta. In 1 of these cases there was a delay of four hours in getting the patient to the hospital, a distance of ten miles, because of a very heavy snowstorm at the time. Two cases of shock followed failure of previous operative attempts.

In the 3 deaths assigned to hemorrhage, 2 followed operations because of separated placenta, and in 1 a cesarean section was done after operative attempts at delivery from below had failed. In 1 of the first 2 cases the patient oozed from a pinprick of the ear, and from a vein where a transfusion was done. Two of these deaths from post partum hemorrhage occurred in the same hospital two to four hours after operation and raise

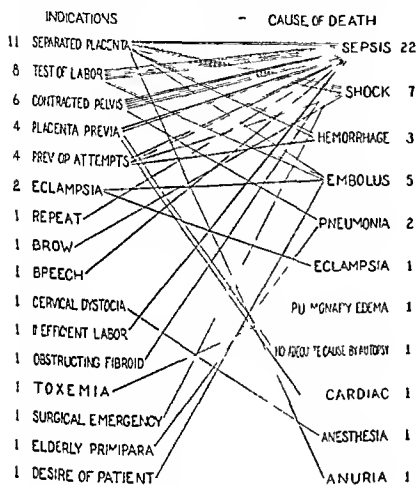


FIGURE 2 Maternal Deaths in 45 Emergency Cesarean Sections

transfusion, the patient died. In this case there was a delay of at least two hours in transfusing. Had this patient been transfused promptly, her life might have been saved.

Forty-five patients died following emergency sections. In these cases, 22 deaths were assigned to sepsis. Fourteen were so designated by their physicians on the death certificate.

One of these cases I report in detail. The patient was a thirty-year-old primipara in labor some forty-five hours, with membranes ruptured an unknown number of hours. Dilatation was very slow. Two vaginal examinations were made. A section was finally decided on. The temperature was reported as 102.6°F. Before the section, of the classic type, was done by a general surgeon, a low pressure 5 gallon douche was given. After the operation, the patient showed signs of sepsis,

the question whether the nursing care in these cases was adequate. Should they be regarded as preventable deaths?

Two of the patients whose deaths were assigned to embolus ran septic temperatures (1 following a Waters type of cesarean) for over a week, and from the questionnaires one wonders whether they were not allowed up too early. It is to be noted that in 1 death assigned to embolus the indication was "the wish of the patient."

The deaths assigned to pneumonia and eclampsia need no comment.

The case attributed to pulmonary edema occurred in a primipara with toxemia. She was in labor some twenty hours, and by the hospital record fully dilated for five hours when a cesarean section (Waters type) was done. At the operation the patient bled more than an average amount. Following operation she passed bloody urine, and twelve hours postoperative the temperature was 102°F., the pulse 140, and the blood pressure 186 systolic, 80 diastolic. Twelve hours later she suddenly developed pulmonary edema and died.

The next death was that of a patient operated on for placenta previa. The note from the obstetrician who investigated this death states that the post-mortem examination, which was performed by a capable pathologist in the presence of several clinical observers, completely failed to reveal the cause of death. The proper diagnosis remains "unknown."

The cardiac death occurred in a woman with long-standing cardiac disease in her tenth pregnancy. She was admitted to the hospital in the seventh month, with partial decompensation. While in the hospital under treatment she began to bleed from a placenta previa. A section under nitrous oxide, oxygen and ether anesthesia was done at once. The baby, weighing nearly 5 pounds, lived, but the mother died on the second day.

The death assigned to anesthesia occurred in a patient who weighed 240 pounds. She had been in labor twenty-four hours. The anesthetist tried for an hour and ten minutes to anesthetize her with nitrous oxide and oxygen. Failing in this, she was given Epival intravenously, and a low section was done at once. The temperature immediately rose to 102°F., with respirations of 40 and rales throughout the chest. She became very dyspneic and cyanotic, and died on the second day.

The last patient in this group had had eclampsia with her first pregnancy and a separated placenta with the third, in both of which cesarean sections had been performed. She had a separated placenta with this, the fourth, pregnancy. The systolic blood

pressure before operation was 220. The patient passed no urine for four days, and died on the seventh day.

* * *

This report shows an encouraging drop in the number of cesarean sections performed in 1939, but it also demonstrates conclusively that too many sections are still being done in Massachusetts.

Cesarean sections figured in 21 per cent of the total number of maternal deaths, demonstrating that this procedure is a major cause of keeping up maternal mortality in the State.

One thousand and ninety consultations are reported, but the consultation in many cases was the mere formality of having a surgeon see the case before he operated.

In some communities a trained obstetrician is not available to lend aid in difficult problems, and the physicians turn to surgeons for help in what appears to them to be serious situations. Few of these surgeons have had any training in obstetrics. They know how to do nothing in the obstetric field, yet do not hesitate to subject a woman to what in many cases is an unnecessary operation.

There are relatively few patients who cannot have the advantage of a really valuable consultation if their physicians give them adequate prenatal care. In most cases, cesarean section should not be an emergency operation, and therefore if a physician wishes and has the best interests of his patients at heart he can always obtain competent help, and need not rely in an emergency on an untrained surgeon who is willing to cut without any desire to think.

One hundred and seventy-three babies were lost. This total is too large and must be lowered if our results are to be regarded as satisfactory. Careful evaluation of the proper method of delivery was not present in many cases. To subject a woman to a section when the baby has a known malformation incompatible with life is not good obstetrics and is not demanded by any religious dogma. Such indications must be eliminated.

Sepsis, as we all know, has been the major cause of deaths from cesarean section, and 1939 was no different from any other year. That 50 per cent of the deaths should be from this cause is a serious criticism of the operators, and as I have said before, these operators must revise both their technique and their judgment in choice of operation. In neither of these points can they be regarded as suitable operators unless marked improvement is shown.

On many previous occasions I have called attention to the fact that the deaths following cesarean section are scattered; no one operator has

several. For 1939, twenty six hospitals reported 1 death each, nine 2, two 3, and one 4. In the last hospital 31 cesarean sections were performed, and in 2, death followed post partum hemorrhage. Such a result is a serious criticism of the hospital, and the cause should be studied and speedily rectified.

The variation in the incidence of cesarean section in large clinics is interesting. How much criticism one can justifiably make is uncertain, but the facts are undeniable. In the two largest clinics in the State the respective incidences were 1 in 36 and 1 in 33, whereas in two other hospitals in the same city the respective incidences were 1 in 11 and 1 in 17. The four largest clinics in another city show respective incidences of 1 in 48, 1 in 40, 1 in 28 and 1 in 19. The complete story is not told by the questionnaires, but one fact is obvious: the major difference in the incidence occurs when private patients are included in the total figures.

The committee appreciates the co-operation shown by practically all the hospitals in filling out the questionnaires. There was, however, a great variation in the care shown in the answers. The

large majority of hospitals filled out the questionnaires fully and carefully, but in a few, usually the smaller ones, the answers were not always satisfactory. In one proprietary hospital in Boston no indication was given for any cesarean section done. In another hospital, no records were filled out for one physician's private cases.

The replies to the questions concerning consultant and operator were so incomplete that no attempt was made to draw definite conclusions. It is clear, however, that in many cases a general surgeon operated, and that no adequate consultation was held.

In many of the hospitals the rule of the American College of Surgeons that all major obstetric operations call for a consultation is being enforced, but not in all. In some hospitals the physicians are graded in relation to what they are allowed to do, and this obviously is a step in the right direction. Until this is done in all hospitals, whether it be in surgery or obstetrics, poor results will continue.

330 Dartmouth Street

TUBERCULOSIS AND MOBILIZATION*

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VOLUNTARY tuberculosis associations throughout the United States have a responsibility in connection with mobilization to urge the exclusion of tuberculous men from the Army, and to help in every way possible in the follow-up of those rejected because of the disease. Adamson¹ reports that the Defense Department of the Dominion of Canada has ordered a chest x-ray examination of every recruit. Standard films and technic have been used. The percentage of rejections for tuberculosis have amounted to 106

Tuberculosis and Mobilization, 1917-1918

In 1917 and 1918, under the selective service regulations, reliance was placed on physical signs for the exclusion of pulmonary tuberculosis. No mention was made of the use of x-ray films in this connection, but registrants were at times thus examined by medical advisory boards. I was at that time a member of an advisory board and placed much more confidence in physical signs for the discovery of pulmonary tuberculosis than

I do now, and called for an x-ray examination only in selected cases.

The selection of registrants for service in 1917-1918 was made under pressure in the face of an emergency. Many men with tuberculosis entered the service, and the magnitude of the tuberculosis problem in disabled veterans may be judged by the cost, which for hospital care, insurance benefit in excess of paid in premiums, vocational training and compensation, is estimated by Spillman² to have amounted already to approximately \$950,000,000.

The tuberculosis problem was much more serious in the United States then than it is today. In Massachusetts, for example, the death rate from the pulmonary form of the disease in 1917 was 121, and in 1940 it had fallen to 34 per 100,000 population.

Tuberculosis and Mobilization 1940-1941

In spite of the remarkable decline in tuberculosis, the pulmonary form is still a serious menace, and more persons in the selective service age group in Massachusetts succumb to tuberculosis than to any other single cause.

*The President's Address delivered at the annual meeting of the Massachusetts Tuberculosis League, Boston, March 20, 1941.

†Fellow professor of medicine emeritus, Harvard Medical School; member, Board of Consultants on Massachusetts General Hospital.

Examination for physical fitness for service of 6,000,000 of the 16,000,000 registrants offers an unusual opportunity for tuberculosis case finding and control on a large scale. It should eliminate those unfit for service from this cause, and through discovery and treatment should safeguard the health of the individual and protect his family and the community.

Once a man is in the service, there is the likelihood of activation of the tuberculosis under physical effort, and danger of spread of the disease to others in the close contact of soldiers in barracks and tents and at mess. Furthermore, the classification of pulmonary tuberculosis in military personnel as occurring in line of duty can be made with fairness only when an x-ray examination, in addition to other methods of investigation, has been made before induction and those with the disease have been rejected.

The expected rejections for tuberculosis among selective-service registrants in the United States may be roughly estimated from the 1.06 per cent rejected for this reason in Canada. There the death rate from the disease is 54.7 (Adamson¹). For the year 1939 in the United States, the death rate from tuberculosis was 46.6, suggesting that with methods similar to those used in Canada the rejections here would in general amount to slightly less than 1 per cent. Since the death rate from this cause varies from 191.0 in Arizona to 15.8 in Nebraska, the percentage will differ in the various states. There are, in addition, some doubtfully significant or suspicious lesions that should later be re-examined. Among other disturbances to be expected, in rare cases, are cysts, polycystic disease, bronchial, pulmonary and mediastinal neoplasms, fibrosis, nontuberculous pneumonia and eventration of the diaphragm.

Importance of X-ray Examination

In the diagnosis of pulmonary tuberculosis, the history is important, and the physical examination should not be neglected. Progress in x-ray equipment and technic, however, is such that no examiner, however skillful, can compete with it in obtaining evidence in difficult cases for the exclusion of those with the disease.

In the use of the x-ray examination of registrants, greater reliance should be placed on standard large (14-by-17 inches) than on miniature films. Competent roentgenologists and facilities for the x-ray examination of registrants are available, and the expense involved is insignificant compared with the cost and hazard incident to admission of those with the disease into service.

In the selection of registrants for service during mobilization, examining physicians are cautioned to be extremely careful to reject those

with pulmonary tuberculosis. In the official regulations² it is stated, "The chest examination will include the usual methods of physical diagnosis, *supplemented, whenever indicated, by radiographic* and laboratory studies* [italics mine]."

Inadequacy of the Present Program

Routine x-ray examination of the lungs of registrants is not required before induction. The lack of general appreciation of the importance of the roentgenogram means that pulmonary tuberculosis has not been excluded in a large proportion of the men called up for service in the United States.

In the First Corps Area (including Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut), through the co-operation of the New Hampshire Tuberculosis Association, the New Hampshire Department of Health, the Adjutant General and the federal military authorities, New Hampshire has led the way in the x-ray examination of men called into service, Burroughs and Frechette⁴ reporting that between September 16 and 26 all officers and enlisted men of the National Guard and candidates for enlistment had an x-ray examination of the chest.

In Massachusetts, through the co-operation of the Massachusetts Department of Public Health and the Army Medical Corps, an x-ray examination has been made of most of the national guardsmen and of the selective-service registrants, when they appeared before the induction boards.

Throughout the First Corps Area the x-ray examination of men called up for service has been carried out in five of the states under the auspices of the state departments of health, assisted in New Hampshire and Vermont by the state tuberculosis associations. In Connecticut it has been carried out under the auspices of the State Tuberculosis Commission.

Not all members of the National Guard inducted into service had chest x-ray examinations, since some had already been inducted into service before the program was under way. In one state, sufficient funds were lacking. In another, chest x-ray studies were made only when it seemed necessary.

Selective-service registrants in the First Corps Area have had an x-ray examination at the time of their appearance before the induction boards. In two states, the x-ray films were developed and read on the day of induction. In one, some, but not all, of the films were interpreted before induction, and in three states none of the films were interpreted before enrollment into service.

From the experience in the New England states,

*X-ray machines, for use in connection with the photography of the fluorescent-screen image on a 4-by-5-inch film, have been ordered by the United States Army.

it is evident that the program has suffered from failure to make plans in advance of mobilization to include and provide funds for a chest x-ray examination as a routine, and to require that registrants be found free of pulmonary tuberculosis by this means before induction into service.

As a result of postponement of the x-ray examination until appearance before the induction boards, those rejected are likely already to have made plans for enrollment, and if there is delay in reporting positive x-ray findings on an otherwise qualified registrant, the man is already in service and may have to be recalled from some distant point.

Recommendations of the National Tuberculosis Association

At the meeting of the Board of Directors of the National Tuberculosis Association on February 15, concern was expressed regarding the lack of adequate provision for excluding pulmonary tuberculosis from the United States Army. A resolution was unanimously adopted that in the opinion

of the board it is highly undesirable to induct men with pulmonary tuberculosis into the Army of the United States and that an x-ray examination of the chest is necessary to exclude the disease. The board makes an urgent appeal that all volunteers and prospective recruits be examined by this means and be found free of pulmonary tuberculosis before induction.

To accomplish this purpose, the orders should come from Washington, and arrangements should be made by local boards for x-ray study at the time of examination. If this study must be delayed until the registrant appears before the induction boards, enrollment into service should be postponed until the result of the x-ray examination is known.

305 Beacon Street

REFERENCES

1. Adelson, J. D. Calcium eliminates TB from army. *Bull Nat Tu Assoc* 4: 26 (63) 171 1940.
2. Spillman, R. The value of radiography in detecting tuberculosis in recruits. *J. A. M. A.* 115 1371 138 1940.
3. *Standards of Physical Examination during Mobilization Regulation 19* 33 pp. Washington War Department 1940. P. 20.
4. Blumhagen, T. P. and Friedman, A. L. Cooperation of health agencies with army authorities. *J. A. M. A.* 115 1459 1940.

PARATHYROID ADENOMA*

Report of Three Cases

ROBERT C. COCHRANE, M.D.

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THE following histories of three proved cases of parathyroid adenoma are presented as illustrating the symptoms, findings and some of the difficulties encountered in diagnosis, operation and postoperative treatment of this condition.

CASE REPORTS

CASE 1. L. O. (B. C. H. 657465, referred by Dr. Joseph H. Shortell), a 30-year-old woman, entered the hospital on December 16, 1931, complaining of a dull pain in the left thigh of several months' duration. She walked with a marked limp, and there was a tender area over the left sacroiliac joint.

X-ray examination showed an area of destruction in the outer aspect of the left ilium, and multiple areas in the right ischium and pubis. There were several punched out areas in the skull and mandible. Similar punched out areas, with irregularity of outline, were seen in both tibiae, the left fibula and both humeri. The spine was normal.

A tentative diagnosis of multiple myeloma was made, but the pathological report on a biopsy from the left tibia showed a tumor of the giant cell class, the suggestion

was made to study the parathyroid function. The blood calcium at this time was 9 mg., and the phosphorus 22 mg. per 100 cc.

In February, 1932, after further x-ray studies, the diagnosis of osteitis fibrosa cystica was made, and Dr. Soma Weiss, with parathyroid dysfunction in mind, put the patient on a high calcium diet, with viosterol in large doses. After 4 weeks, x-ray films showed marked bone regeneration in the previously rarefied areas of the pelvis. The patient was discharged from the hospital on a high-calcium diet, and an x-ray film the next month showed the defect in the right ilium to be entirely filled with solid bone.

She was readmitted to the hospital on May 13, because of a pathological fracture of the upper third of the left femur. The blood calcium was 13 mg. and the phosphorus 41 mg. per 100 cc. (Fig. 1). On June 14, her neck was explored and a search made for a parathyroid tumor. None was found, but two small masses thought to be parathyroid glands were removed. Only one of them proved to be parathyroid tissue. Following the operation the patient developed secondary anemia and sustained a pathologic fracture of the left humerus. The cortex of all the long bones at this time was almost paper thin (Fig. 2).

On July 7, a second exploration of the neck was made, and the left lobe of the thyroid gland was removed. No parathyroid tissue was found. The blood chemical find

*Presented at the annual meeting of the New England Society of Surgeons, Boston, September 28, 1940.

This case professor of surgery, Harvard Medical School, and chief of second surgical service, Boston City Hospital.

Examination for physical fitness for service of 6,000,000 of the 16,000,000 registrants offers an unusual opportunity for tuberculosis case finding and control on a large scale. It should eliminate those unfit for service from this cause, and through discovery and treatment should safeguard the health of the individual and protect his family and the community.

Once a man is in the service, there is the likelihood of activation of the tuberculosis under physical effort, and danger of spread of the disease to others in the close contact of soldiers in barracks and tents and at mess. Furthermore, the classification of pulmonary tuberculosis in military personnel as occurring in line of duty can be made with fairness only when an x-ray examination, in addition to other methods of investigation, has been made before induction and those with the disease have been rejected.

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From the experience in the New England states,

*X-ray machines, for use in connection with the photography of the fluorescent-screen image on a 4-by-5-inch film, have been ordered by the United States Army.

tion as a result of kidney damage and infection was to be expected

This case well illustrates the difficulty of finding parathyroid tumors, or even normal parathyroid glands. A persistently careful exploration of the neck at the first operation in the usual location of parathyroid glands, the retro-tracheal and esophageal areas and the mediastinum proved fruitless. Only one of the two masses removed from the right side of the neck proved to be parathyroid tissue. Inasmuch as the tumor was subsequently found within the thyroid gland on this side, presumably all parathyroid tissue was removed from this side, yet no glands were

examined. The blood showed calcium 118 mg, phosphorus 20 mg, nonprotein nitrogen 20 mg, blood sugar 87 mg, cholesterol 128 mg and phosphatase 206 (Bodansky) units per 100 cc (Fig 3). X-ray examination showed degenerative cystic changes of both tibiae and patellae and of the pelvis, ribs and skull. A biopsy specimen from the right tibia showed osteitis fibrosa cystica, with osteoid formation in part and benign giant-cell tumor elsewhere.

On June 9, the neck was explored through the usual collar incision. The pretracheal muscles on the right were divided between clamps, and the right thyroid lobe freed and rotated toward the mid line, exposing a tumor the size of a large olive on its posterior surface amid terminal branches of the inferior thyroid artery. It was yellowish brown. A portion was removed for diagnosis, and a frozen section showed a parathyroid adenoma.

About three fourths of the tumor was resected, and the wound closed without drainage. The portion removed weighed 55 gm, and the estimated weight of the tumor itself was 75 gm. Twenty-four hours after the operation the blood calcium had dropped to 10 mg, the phosphorus to 17 mg and the phosphatase to 86 units per 100 cc. The calcium reached its low point of 7.3 mg on the 3rd day. The phosphorus steadily rose until it was normal. The phosphatase remained elevated for some time.

The convalescence was uneventful, save that on the 4th postoperative day there were mildly positive Chvostek and Trousseau signs. These disappeared under treatment in 4 days.

On August 15, the blood calcium was 9.8 mg, the phosphorus 4.1 mg, and the phosphatase 47 units per 100 cc. Subsequent check-ups have shown the blood chemical findings to be normal. The patient is symptom free, and the bony defects have recalcified.

Comment. The blood chemical findings and bone picture in this patient were typical. The tumor was readily located, and its appearance was such that it could not be mistaken for any other tissue. The tumor was not entirely removed because I wished to avoid the severe symptoms of tetany encountered in Case 1, and believed that if necessary more could be easily removed later because of its accessibility. Fortunately, the amount resected proved sufficient.

CASE 3 F K, a 68-year-old man who worked as a foundry foreman, entered the Faulkner Hospital on December 26, 1939, having been referred by Dr. Gerald L. Doherty. Three weeks before admission his right hip was injured by the premature closing of a street-car door. The hip was painful, but he managed to get about. He thought it to be rheumatism, and consulted an osteopath. Four treatments aggravated the pain. He was then seen by Dr. Doherty, who diagnosed the case as a fracture of the neck of the right femur, and sent him to the hospital. The diagnosis was confirmed by x-ray study, and the previous history was suggestive of a pathologic fracture. The patient was well until September, 1938, when he fell and fractured his right clavicle. This healed within a month. In January, 1939, he again fell and fractured the neck of his left humerus. This also healed promptly. In May he fractured the neck of his right humerus. All these fractures healed rapidly, and in none was an x-ray film taken.

His general health had been excellent save for the fractures. He had lost 10 or 12 pounds in the year preceding entry.

The reflexes were normal. The heart was somewhat

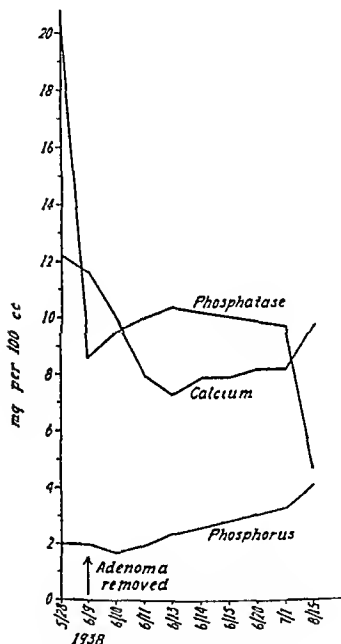


FIGURE 3 Laboratory Data in Case 2

found in the left thyroid lobe removed at the second operation, and none were found on post mortem examination. The question arises whether this patient had only two parathyroid glands, or whether both surgeon and pathologist were incapable of identifying them.

CASE 2 C R J (B C H 900326), a 39-year-old man, entered the hospital on May 26, 1938, because of rheumatic pain in both knees for 2 years, which was aggravated by climbing stairs. Six months before admission, his left knee became swollen and painful. This gradually subsided, but was followed by a swelling below the right knee.

Examination showed a hard, slightly tender mass about 8 cm long and 4 cm wide on the anterior surface of the right tibia in the upper third. There was no limitation of motion in the joint. Physical examination was otherwise negative.

enlarged to the left, but the sounds were of good quality. There were no murmurs. The lungs were clear save for rales at both bases. The liver edge was four finger-breadths below the costal margin and not tender. There was no edema. The prostate was small and nontender. There was a deformity of the outer third of the right clavicle, and also a deformity of the right hand in the 3rd metacarpophalangeal joint. The right leg was shorter than the left; the foot was everted, with an overriding of the shaft of the femur on the neck. The spine was normal. The blood pressure was 156/90.

Three days after admission extensive x-ray examinations showed: old fractures of the left 7th and 8th ribs posteriorly, and of both humeral surgical necks and both clavicles; a recent fracture of the neck of the right femur;

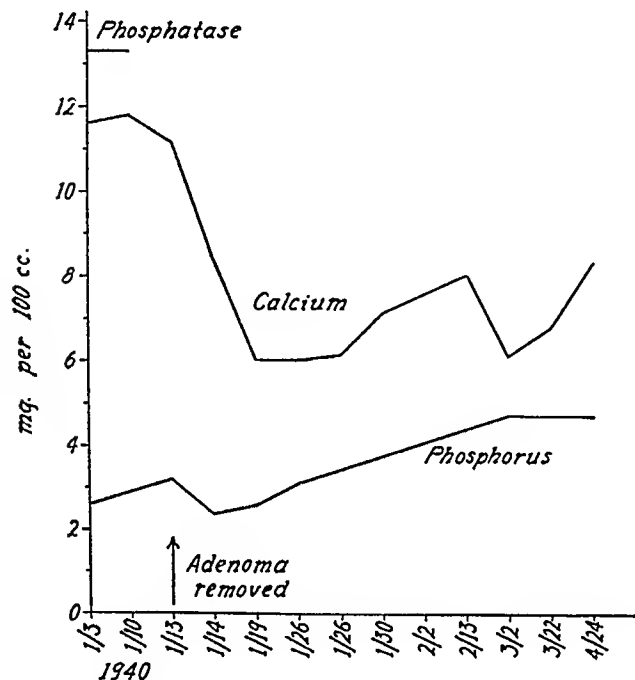


FIGURE 4. Laboratory Data in Case 3.

a questionable incomplete fracture of the neck of the left femur; slipping of the 5th lumbar vertebra forward on the sacrum with hypertrophic changes; cystlike cavities in lower ends of the femurs, with decalcifications; generalized osteoporosis, with coarseness of bone trabeculations suggestive of a metabolic disease; a question of stone in the right kidney; and cystic areas in shafts of both humeri, the upper end of the right radius and both tibias. A diagnosis of osteitis fibrosa cystica was made.

The blood calcium was 11.6 mg., the phosphorus 2.6 mg., and the phosphatase 13.3 (Bodansky) units (Fig. 4).

On January 9, 1940, x-ray study of the gastrointestinal tract was negative. X-ray films of the chest showed the transverse diameter of the heart to be 13 cm. The left ventricle was slightly prominent, and the aorta elongated and tortuous. In the right upper mediastinum, extending as low as the aortic arch, was an oval mass 4 by 6 cm. (Fig. 5). The trachea was displaced to the left by the mass, which lay on the right of and posterior to the trachea. The trachea was slightly narrowed at this point. The mass moved with the trachea on swallowing. The appearance was that of an intrathoracic goiter, but the question was raised as to its being a parathyroid tumor.

On January 13, the thyroid gland was exposed through the usual collar incision. The pretracheal muscles on the

right were divided between clamps. Both superior and inferior thyroid arteries on the right side were ligated, and the right lobe was rotated medially. Continuous with the lower pole was an intrathoracic mass the size of a plum, which was easily delivered from the chest. The tumor was brownish and appeared to be an enlarged

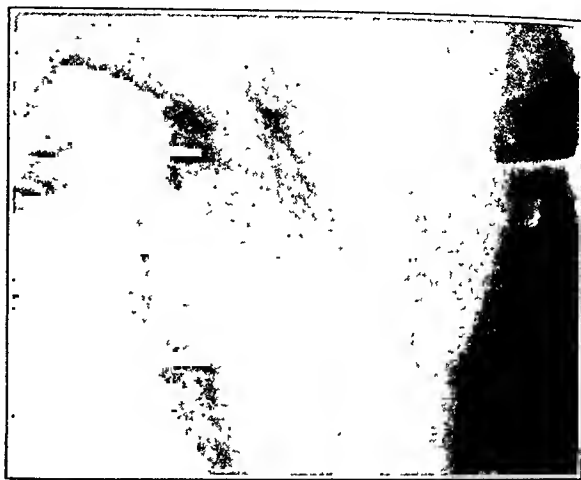


FIGURE 5. Case 3.

This is a spot film of the mass on the right of the deviated and compressed trachea.

parathyroid gland that had migrated downward from its normal location near the lower pole of the thyroid gland to lie posterior to the trachea. The mass was excised, and a frozen section showed it to be a parathyroid adenoma. The mediastinum was drained and the wound closed. The pathological report was as follows: The specimen was an ovoid nodule 5 by 2.5 by 3 cm., weighing 25 gm. (Fig. 6), which by microscopic examination proved to be a parathyroid adenoma.

On the 6th postoperative day the blood calcium reached its lowest level, 6.0 mg. per 100 cc.; the phosphorus was 2.6 mg. It was probable that this level had been reached

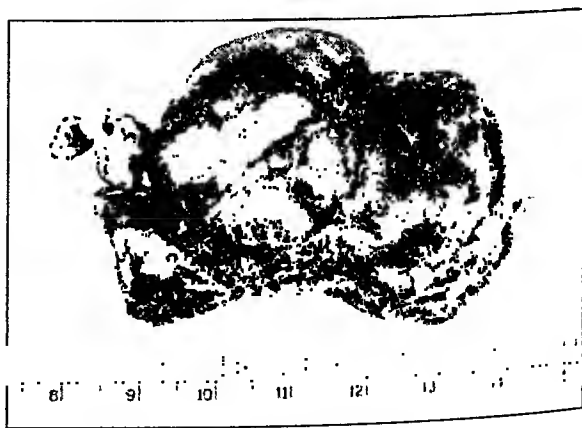


FIGURE 6. Case 3.

The tumor mass after surgical removal.

by the 3rd postoperative day, since at that time the patient became very irritable, nervous and apprehensive. On the 5th day, although Chvostek and Trousseau signs were absent, he developed a tremor and muscular twitchings. The positive signs developed in about a week. He de-

veloped bladder tetany, had to be catheterized and was eventually put on constant drainage. A high nonprotein nitrogen was improved by forcing fluids, and as soon as the chlorides were normal, the saline solution was changed to glucose. At this point, on the advice of Dr Joseph Aub, the patient was given a much larger dose of calcium and parathormone, and from then on steadily improved. By the end of the 2nd week, he had been taken off constant drainage, was able to void, was sitting up in a chair and had recovered his usual cheerful disposition. The parathormone had been decreased, and he then was given dihydrotachysterol (A T 10).

He was discharged from the hospital February 8, much improved. Recalcification of his bones was beginning to be evident by x-ray films. Further x-ray study on May 10 showed still further recalcification. The dihydrotachysterol was discontinued in May, and in August the hip was solidly united and the patient was back at work.

Comment. This patient was considerably above the average age for this disease. It is remarkable that he could have sustained multiple fractures in a 2 year period without x-ray check up and without the suspicion that pathologic fracture might have arisen. The bone and blood picture was typical. The location of the tumor was uncertain, although the intrathoracic tumor suggested that a parathyroid gland had descended into the chest with the lower pole of the thyroid.

When the large parathyroid tumor was delivered it was deemed best to remove it entirely, because its uncommon location would have made a secondary operation hazardous. Also the trachea was deviated and constricted and it was necessary to remove this source of pressure.

The immediate drop in calcium and phosphorus was characteristic. The postoperative symptoms, as anticipated were rather severe and prolonged, but eventually recovery was complete. The patient required a great deal of treatment, and his kidney function was much impaired in the early part of the postoperative course. This patient showed the shadow of a probable stone in the right kidney. Dihydrotachysterol was very useful and was continued for 4 months before his calcium balance was completely re-established.

SUMMARY AND CONCLUSION

Three proved cases of parathyroid adenoma together with their significant findings are reported.

In two cases, the tumor was found in an unusual location. Both patients had evidence of impaired renal function and kidney stones.

The uneventful convalescence and recovery of a patient with a large adenoma in a normal position suggests partial resection rather than complete removal as the operation of choice.

319 Longwood Avenue

DISCUSSION

Dr EDWARD D. CHURCHILL, Boston. Dr Cochrane has presented us with three museum pieces of parathyroid disease, scientifically studied and skillfully handled from the surgical point of view. There are so many aspects that might be discussed that I shall very rigidly confine myself to a few notations about the operative management.

The first problem in parathyroid surgery is to find the tumor. Dr Cochrane and I were talking last night about

the psychologic state of the surgeon toward the end of the second hour of a search for a parathyroid tumor, and the necessity at that time of having a positive diagnosis to stiffen his courage. A similar psychologic state is met when one faces the necessity of operating for the second, third or fourth time on a very sick patient. Hyperparathyroidism is a diagnosis that cannot be disproved by surgical dissection. Even if four normal parathyroid glands are found there may be a fifth somewhere in a remote region of the mediastinum that cannot be reached.

A large mediastinal tumor may be demonstrated by esophageal deformity with a swallow of barium. Tumors of the posterior mediastinum are usually large and are apt to be anchored in the neck by an attachment in the region of the inferior thyroid artery. Those in the anterior mediastinum represent an embryologic descent or an origin from one of the lower branchial clefts. It is the anterior mediastinal tumor that is most likely to give the greatest surgical difficulty. If the tumor is large it can be delivered as a substernal goiter is delivered, but there is no chance of reaching or palpating a tiny fragment of soft tissue that is low. The only answer to this problem is a manubrium splitting incision that affords direct visual access to the anterior mediastinum. Here again one has to be backed up by a positive diagnosis.

Dr ERNEST M. DALAND, Boston. I should like to call attention to an article in a recent number of the *British Journal of Surgery*. The writer noticed that in some cases of parathyroidism, both when the tumor had been removed and when it had not there had not been proper regeneration of the bone around the cyst. He devised a scheme of using aluminum acetate in large quantities, given by mouth and reports a large number of cases in which he has had prompt regeneration of the cysts in cases in which they had failed to regenerate following the customary therapy.

The mechanism apparently is such that the acetate salt combines with the phosphates forming aluminum phosphate. This allows the calcium to be deposited. The author mentioned above has also used this in a number of cases of rheumatoid arthritis which he considers to be a dysfunction of the parathyroid glands with excellent results.

Dr JOHN HOMANS, Boston. Of course the fascinating side of this technical procedure is the discovery not only of the tumor itself but also of the other parathyroid glands. A good deal of stress has been laid by Dr Cochrane and Dr Churchill on finding these tumors well inside the mediastinum. As a matter of fact during the third hour of a search for one of these tumors while I was hopefully opening the jaws of a hemostat here and there over the operative field having looked behind the trachea and esophagus I happened to insert and open my snap at the junction of the superior thyroid artery with the external carotid and there at the apex—of course the superior thyroid artery slants rather downward—was a good sized parathyroid tumor.

The tendency is to look downward whereas this time the tumor was in an unusually high position.

Dr COCHRANE (closing). What interested me in the first patient was that after I had presumably removed all the parathyroid glands on the right side, and had apparently missed the parathyroid glands when I took out the left lobe of the thyroid the pathologist at post mortem could find no remaining parathyroid tissue. It raised the question whether the patient actually had four parathyroid glands or only two or three.

I want to emphasize again the point Dr. Churchill brought out about the psychologic handicap to the surgeon in the cases in which one has the typical bone picture but not the typical blood chemical findings. After one has searched for two hours unsuccessfully, in an atypical case, there is a doubt in one's mind whether to go on and subject the patient to any more search.

Dr. Lahey called me the day before yesterday to say

he was sorry he could not come to discuss the paper. He told me that he had just operated on a patient who, he was absolutely convinced, had a parathyroid adenoma, but that he had failed to find the tumor. Previously three excellent surgeons had explored the neck without success. This emphasizes the fact that it is an extremely difficult thing to find the parathyroid glands, even when one is positive that a tumor is present.

STAPHYLOCOCCAL TRACHEOBRONCHITIS TREATED WITH SULFAMETHYLTHIAZOLE AND SULFATHIAZOLE

Report of Two Cases

MAURICE H. SHULMAN, M.D.

SALEM, MASSACHUSETTS

EACH of the recent developments in the field of chemotherapy has been followed by a flood of confusing reports and claims. Sulfamethylthiazole and sulfathiazole have been no exception. A survey of the literature shows consistently good results obtained in staphylococcal infections.

Bacteriologic experiments conducted by Rake and McKee¹ have shown sulfamethylthiazole and sulfathiazole to be particularly effective. This is further substantiated in a report by Krock and Chamberlain.²

Many different types of staphylococcal infections have been successfully treated with these drugs. Grulee and Mason³ report excellent results in cases of furunculosis in children. Fitch⁴ obtained noteworthy results in a case of epidural abscess with septicemia and pyemia due to *Staphylococcus aureus*. Another case of staphylococcal septicemia, with excellent end results following the use of sulfamethylthiazole, is reported by Carroll et al.⁵

In a study of the literature one is immediately aware of the many toxic effects of these drugs. Pepper and Horack⁶ report the formation of concretions in the renal tubules following sulfathiazole therapy. Knoll and Cooper⁷ also report clinical urolithiasis due to sulfathiazole. Haviland and Long⁸ report conjunctival and scleral reactions in the course of such therapy. Further study of these reports reveals that the aged are more susceptible to these toxic effects than patients in the younger age groups.

The two cases reported in this communication throw light on the use of sulfamethylthiazole and sulfathiazole in staphylococcal laryngotracheobronchitis. The former was originally supplied by the Winthrop Chemical Company for experimental purposes only, but was then withdrawn from the market because of reports of toxic effects; the lat-

ter was used in the second case. The initial dosage of both drugs in these cases was $1\frac{1}{2}$ gr. per pound of body weight, given in four doses. The daily dosage thereafter was 1 gr. per pound of body weight.

CASE REPORTS

CASE 1.* A 2-year-old girl was admitted to the Salem Hospital in February, 1940, after an illness of 3 days. She had had malaise and hoarseness, with some fever, at home. Hoarseness became progressively worse, and the patient developed cyanosis during a coughing spell. Breathing became more labored, and the patient was hospitalized.

The family history was noncontributory. The patient was the only living child. At 3 months of age she developed mild eczema, which was much less intense on admission. The developmental history was normal. The patient had received injections of Sauer's vaccine, but no other immunizations had been performed. The present illness was the first real illness that the patient had had.

On entry physical examination revealed an acutely ill girl, who was markedly apprehensive and restless. The lips and nailbeds had a grayish, cyanotic tinge. There was some inspiratory difficulty, with slight substernal retraction. The respirations were noisy and wheezy. The tonsils were reddened, but no membrane was present. Auscultation of the chest revealed harsh rhonchi and sibilant and sonorous rales at both bases. The remainder of the examination was negative.

A diagnosis of laryngotracheobronchitis was made, and the patient was seen by an otolaryngologist. Expectant treatment was immediately instituted. This consisted of a croup tent and careful use of Sodium Amytal for restlessness. Throat smears revealed gram-positive organisms, tentatively called pneumococci, and sulfapyridine by mouth was given. Early in the morning of the day following admission, the patient had a choking spell and became cyanotic; the respirations were shallow and labored. A Mosher lifesaver was passed, and an emergency tracheotomy was done. Throat culture taken at entry grew a pure culture of *Staphylococcus aureus* (hemolytic). Sulfamethylthiazole was started with a Levine tube. For the next 7 days, the patient had a stormy course. The tracheotomy tube frequently became plugged up by thick, yellowish

*Reported through the courtesy of Dr. Robert T. Moulton.

crusts. The temperature varied from 101 to 105°F. The respirations remained about 40.

For 5 successive days the patient had a positive blood culture for *Staph aureus*. The blood level of the sulfamethylthiazole was kept between 3 and 5 mg per 100 cc. On the 5th day of medication, a morbilliform rash appeared. This was considered to be a drug rash and subsided in a few days. Several blood transfusions were given. Sulfamethylthiazole was discontinued slowly. The urine showed a positive culture for *Staph aureus* at one time, and frequently showed red blood cells and white blood cells in the sediment.

The tracheotomy tube was removed on the 17th day, after which the patient did very well. The wound healed rapidly, and the patient was discharged recovered on the 23rd day following admission.

Case 2. W. M., a 1-year-old boy, had been very well until June 22, 1940. At that time the patient was first seen at home, and a diagnosis of "croup" was made. He became progressively worse, and breathing was much more labored. Failing to respond to routine treatment the patient was admitted to the Salem Board of Health Hospital.

The family history was not remarkable except for marked allergy. One brother, 4 years old, had had severe eczema. The feeding history was uncomplicated except for slight eczema, which cleared up when the patient was put on an evaporated milk formula. The developmental history was normal. The patient had received Sauer's vaccine and diphtheria toxoid.

At home the patient had a temperature of 100°F by rectum, and respirations up to 40 per minute. No cyanosis was noted until entry on June 24. He was quite restless. At the onset of the disease, the patient had some inspiratory difficulty and no substernal retraction. Inspiration became more difficult, and the substernal retraction very marked. The chest was clear to auscultation. The throat and tonsils were red. The remainder of the physical examination was negative.

On entry to the hospital, a diagnosis of laryngotracheobronchitis was made. Because of progressive difficulty in breathing, in addition to the appearance of cyanosis, an otolaryngologist saw the patient immediately on arrival at the hospital. Tracheotomy was done at once. When the larynx was opened, the patient coughed up several large plugs of pus and immediately fell asleep. Culture of these plugs grew a pure culture of *Staph aureus*, which was slightly hemolytic.

A tracheotomy tube was secured in situ, and the patient was placed in a steam-filled room. As soon as reports of the throat cultures were obtained, he was started on sulfathiazole. Repeated blood cultures were negative. Several cultures taken from the tube grew *Staph aureus* with hemolysis in pure culture.

For 4 days after tracheotomy was done, the temperature remained about 103°F, the pulse 150, and the respirations about 40. The course was quite stormy, and several times

the tracheotomy tube became obstructed by thick plugs of mucus.

On the 5th day, the urine sulfathiazole had reached a level of 30 mg per 100 cc, and the temperature and respirations became normal. The pulse remained about 120. Convalescence was much smoother after the 5th day, but plugs of mucus collecting in the tracheotomy tube continued to be very troublesome and required constant watching.

Sulfathiazole was gradually withdrawn and finally omitted on July 7, after 14 days of administration. The temperature, pulse and respiration did not rise above normal. The hemoglobin never fell below 60 per cent, and the red cell count was never below 3,340,000. With administration of iron by mouth, the hemoglobin was 80 per cent and the red cell count 4,000,000 on discharge.

On July 8, 15 days after insertion, the tracheotomy tube was removed, with no ill effects. The wound healed rapidly, and the patient was discharged recovered on July 14, exactly 3 weeks after tracheotomy was done.

SUMMARY AND CONCLUSION

The literature on sulfamethylthiazole and sulfathiazole is reviewed. Special emphasis is placed on the toxicity of these two drugs, the former having been withdrawn from the market by the manufacturer.

Two cases of staphylococcal tracheobronchitis necessitating tracheotomy are reported. The first case was associated with a staphylococcal bacteremia, hitherto nearly 100 per cent fatal. In both, staphylococci were recovered in pure culture from the throat or coughed up plugs.

The value of sulfamethylthiazole and sulfathiazole in combating staphylococcal infections is thus substantiated by the successful outcome of these two cases.

60 Washington Square

REFERENCES

1. Rake G. and McKee C. M. Action of sulfathiazole and sulfamethylthiazole on *Staphylococcus aureus*. *Proc Soc Exper Biol & Med* 43: 561-564 1940.
2. Kirsch P. H. and Chamberlain C. T. The clinical use of sulfamethylthiazole in infections caused by *Staphylococcus aureus*: a case report. *J Arkansas M Soc* 36: 247 1940.
3. Grulke C. G. and Mason J. T. A new treatment for furunculosis (sulfamethylthiazole). *J Pediatr* 16: 566-569 1940.
4. Fitch T. S. P. Sulfathiazole in *Staphylococcus aureus* epididymitis: with septemia and pyemia. *Arch Pediatr* 57: 119-124 1940.
5. Carroll C. H., Kappel L., Jones L., Gallagher F. W. and DiRocco P. W. Sulfamebithiazole: a report of its clinical use in staphylococcal septicemia with apparent success: report of an animal experiment. *So. Western M J* 33: 83-87 1940.
6. Pepper D. S. and Horack H. M. Crystalline concretions in the renal tubules following sulfathiazole therapy: widely patent foramen ovale in a patient aged 77. *Am J M Sc* 199: 674-679 1940.
7. Knoll A. F. and Cooper F. B. Clinical urolithiasis: a med. cementosis due to sulfathiazole. *Urol & Cutan Rev* 44: 292-294 1940.
8. Haviland J. W. and Long P. H. Skin conjunctival and scleral reactions in the course of therapy with sulfathiazole. *Bull Johns Hopkins Hosp* 66: 313-318 1940.

MEDICAL PROGRESS

PLASMA PROTEINS IN HEALTH AND DISEASE*

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ONE hundred and fourteen years ago, Dr. John Bostock,¹ chemist and physiologist of Guy's Hospital, studied urine and blood from Richard Bright's dropsical patients. In addition to his classic observations on the characteristics of the urine, Bostock reported to Bright, "I think I may venture to say, that the serum generally in these cases contained less albumin than in health, although I am not able to state precisely the amount of this difference." Thus, in 1827, a disturbance in the normal pattern of the serum proteins was established as a chemical characteristic of a diseased state.

In the field of immunology, von Behring² demonstrated in 1890 that the injection of attenuated diphtheria toxin into animals resulted in the formation of antitoxin in the serum, which could be employed for preventive or therapeutic inoculations. Since these immune substances are now known to be modified serum globulins, the practical as well as the theoretical importance of the serum proteins in the field of immunochemistry becomes obvious.

In 1896, Starling's³ simple and yet decisive observations on the relation between the hydrostatic pressure in the capillaries and the osmotic pressure of the serum proteins gave rise to a now familiar physiologic concept of extraordinary importance. Although Starling's work is well known, I cannot resist quoting some of the conclusions drawn by him on the basis of his experiments. He measured the return of fluid to the blood stream following the perfusion of edematous limbs, and correlated the relation of the hydrostatic pressure in the capillaries with the effective osmotic pressure of the serum proteins, which he measured directly. Starling wrote:

At any given time there must be a balance between the hydrostatic pressure of the blood in the capillaries and the osmotic attraction of the blood in the capillaries for the surrounding fluids. With increased capillary pressure there must be increased transudation—with diminished capillary pressure there will be an

osmotic absorption of salt solution from the extra vascular fluid. . . .

The significance of these representative contributions from the field of clinical medicine, immunology and physiology is apparent. Nevertheless, Morawitz,⁴ who himself developed in 1906 the technic now termed "plasmapheresis" for the study of the regeneration of serum proteins, wrote in 1909, "Many studies of blood serum in various disease conditions are on record . . . but little of importance to pathology and physiology has been gained." Our ignorance of many elementary facts concerning the serum proteins even today is great, yet this need not be a cause for discouragement. Few problems have sustained the interest and engaged the investigative activities of physicists, chemists, immunologists, physiologists and clinicians more than those concerning the serum and plasma proteins. The progress made in recent years concerning the nature of the plasma proteins, their source, their regeneration, their abnormalities in various diseased states, the physiologic disturbances attendant on their depletion, as well as their therapeutic value in the correction of certain physiologic disorders, is truly gratifying. It is toward certain aspects of this progress that I desire to draw attention in this review.

STUDY OF THE NATURE OF PLASMA PROTEINS

One of the ultimate aims of the chemist is to identify beyond question the nature of a substance by means of establishing its structure. In the field of protein chemistry, this aim is yet to be attained. This is true even though the percentages of various amino acids present in many proteins are well established and many of the linkages of amino acids and peptides have been recognized through the work of Bergmann⁵ and others in the last fifteen years. Thus, although insight into the complex structure of the protein molecule has been gained by means of these studies of the action of various enzymes on synthetic and known substrates, the groupings that lead to the specific characteristics of proteins remain obscure. The difficulties in solving the problems of the chemistry of the proteins center about the enormous com-

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plexity of the molecules, many of which include side chains of lipids and carbohydrates. Moreover, many of the proteins undergo denaturation with even the gentlest chemical manipulation.

The chemistry of the plasma and serum proteins naturally constitutes only a special problem in general protein chemistry. In default of essential knowledge, serum proteins are today, as in the past, classified on the basis of convention. Thus the protein of the plasma or serum that remains in solution after half saturation with ammonium sulfate or is not precipitated by 21.5 per cent sodium sulfate is defined as albumin. The proteins salted out by these means are known as globulins. By using lower concentrations of salt solutions for precipitation, the globulins are subdivided into fractions termed euglobulin, pseudoglobulins I and II and fibrinogen. Salting out continues to be the accepted method for determining the presence and concentrations of various serum protein fractions. This procedure yields information that has been of immeasurable value in the practical preparation of immune serums, in the characterization of a number of diseased states to be discussed, and in the vast majority of studies devoted to the physiologic importance of the serum proteins. Nevertheless, it must be recognized that the fractions thus estimated embrace a large number of proteins with strikingly different characteristics, and that the various components often represent loose chemical combinations of two or more proteins. The true albumins have been shown repeatedly to have a molecular weight of the order of 70,000 and those of the globulins approximately 170,000.

In the last decade, three new approaches have been applied to the study of the serum proteins. These include first, the technic of ultracentrifugation, secondly, electrophoresis, and thirdly, the application of immunochemical reactions.

The ultracentrifugation method developed by Svedberg⁶ for the study of protein solutions consists in sedimenting the molecules from a solution by means of centrifuges of special construction. These centrifuges are capable of developing rates up to 200,000 revolutions per minute, and are fitted with optical contrivances making it possible to record photographically by means of various lengths of visible and ultraviolet light the rate of sedimentation of various solutes. In this way the molecular weights of one or more substances can be determined, since the rate of sedimentation is a function of the mass of the molecule and the centrifugal force. This method also offers a valuable check on the purity of a given solute,—in this view, a serum protein,—since the substances of different molecular weights will be sedimented at

different rates and different stratum of molecules appear in the photographs obtained.

The second technic, which is proving of great value both chemically and clinically in the study of serum proteins, is in reality an old one. In 1899, Hardy⁷ demonstrated the migration of colloidal particles in an electric field. This phenomenon is termed electrophoresis. The method was later successfully employed by Michaelis⁸ to distinguish certain enzymes and proteins by their mobilities and their isoelectric points. This electrophoretic technic, which is in principle identical with that of measuring the mobility of ordinary ions, has been modified in recent years. Tiselius⁹ has made it possible to record accurately the rate of migra-

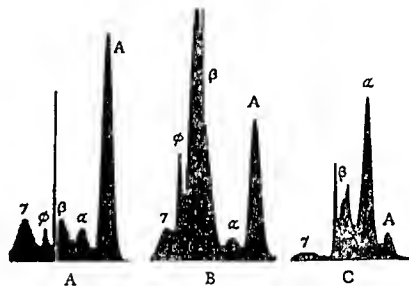


FIGURE 1 Plasma and Serum Protein Analyses Derived by the Electrophoretic Method (after Longworth, Sheldonsky, and MacInnes¹⁰) (Reproduced by courtesy of the publisher.)

A = normal plasma B = plasma from a case of multiple myeloma C = serum from a case of nephrosis

tion of various proteins, and to separate these fractions for subsequent analysis by other means without altering their chemical nature by polarizing or heating currents. These measurements are made under standard conditions of pH, ionic strength and temperature. Like the ultracentrifuge, the boundary of the migrating molecules can be recorded photographically, employing what is known as the Toepler Schlieren method. This depends in principle on the detection of "small inhomogeneities in refractive index," caused in the serum proteins by the boundaries of the various protein fractions, migrating at different velocities. Longworth et al.^{10, 11} have ingeniously modified further the method of Tiselius and of Philpot¹² for recording the velocity of migration of various solutes. From the curves obtained by his method, calculation of the concentration of various solutes is made possible, in addition to separation of these on the basis of their velocity of migration. In Figure 1 may be seen curves obtained by Longworth et al.

intake; the maintenance of nitrogen equilibrium in the fasting animal by the intravenous administration of plasma proteins; the feeding of amino-acid mixtures in amounts sufficient to maintain nitrogen balance, in which the recent work of Mitchell and his colleagues²³ demonstrates that only seven of these acids are essential in the adult rat; the intravenous, subcutaneous or oral administration of casein hydrolysates to which are added tryptophan and cystine or methionine.

In the course of plasma protein depletion, as brought about in animals either by protein starvation, the technic employed by Weech, or by plasmapheresis in dogs maintained on a low but adequate protein intake, the method used by Whipple and his associates¹⁷ for many years, the albumin fraction suffers primarily. This is particularly unfortunate for physiologic reasons. If protein depletion has been of short duration, repletion is rapidly accomplished by the means of protein feeding. If depletion is of long standing, the rate of protein repletion, as shown by Weech, is at first rapid, but then the pace is slowed and months may be required to attain the original levels. This is true not only in animals but also in man. Of interest, but still unexplained, is the fact that after depletion of certain reserve stores of plasma protein, the protein-starved animal is unable to utilize effectively his remaining body protein or its disintegration products for plasma protein regeneration.

In contrast to clinical states of hypoproteinemia brought about by undernutrition and curable by the methods that have been shown to prevent hypoproteinemia, stand cases of nephrotic and hepatic hypoalbuminemia. Regeneration of plasma proteins in these cases is notably ineffective, owing to a failure of the albumin-synthesizing mechanism. Treatment with high-protein diets or protein autolysates brings about the storage of body protein without regeneration of plasma protein, particularly serum albumin.

In recent years Madden and Whipple and also Weech have shown beyond question that the type of protein fed is of considerable significance in relation to its efficacy in bringing about plasma protein regeneration—this applies with certainty to albumin, which is of prime importance. Thus, it has been shown that beef serum protein has an extraordinarily high potency value in plasma protein regeneration. Beef muscle, casein, egg white and others are of medium potency, and of low potency are gelatin, zein, dog red blood cells and so forth, as shown in Table 1. Evidence concerning globulin regeneration is still controversial and fortunately of more purely academic interest.

In summary, then, plasma protein regeneration in hypoproteinemic states resulting from under-

nutrition can be corrected by the liberal administration of protein, amino acids or protein autolysates. Furthermore, in addition to the quantity of protein, its quality has been shown to be a matter of considerable importance. Finally, in states in which hypoproteinemia appears to be associated, at least in part, with a disturbance in serum albumin synthesis, administration of protein may

TABLE 1. *Potency of Various Foods for Plasma Protein Formation.**

HIGH POTENCY	MEDIUM POTENCY	LOW POTENCY
Beef serum	Egg white	Gelatin
	Autoclaved yeast	Zein
	Beef chuck	Pancreas
	Beef liver	Canned Salmon
	Casein	Red blood cells of dog
	Lactalbumin	Spleen
	Cooked pork kidneys	Beef stomach
	Polished rice	Pork brain

*Modified from Madden and Whipple.¹⁷

lead to storage of body protein, with little if any increase in the serum protein concentrations.

DISTURBANCES OF SERUM ALBUMINS AND SERUM GLOBULINS IN DISEASED STATES

Modern medicine owes to a New York clinician, Dr. Albert Epstein,^{24, 25} a great debt. His studies made between the years 1912 and 1917 on the disturbances of the serum proteins in disease and his application of the Starling hypothesis in the explanation of nephrotic edema served as a great stimulus for the mass of clinical investigation in this field in the past twenty-five years.

In the normal adult, the concentration of the serum proteins varies between 6 and 8 gm. per 100 cc. The proteins determined in the albumin fraction vary between 4 and 5.5 gm., and the globulins fluctuate between 1.5 and 2.5 gm. as measured by the three methods previously discussed. It has been customary in the past to lay great emphasis on the ratio of albumin to globulin. This tradition finds its origin in the work of Epstein. He pointed out in 1912 that the decrease in serum proteins in the nephrotic state did not result from hemodilution because, if this were so, the albumin globulin ratio would remain constant. In reality, the albumin fraction was found to be sharply decreased, and the globulin perhaps slightly increased. Thus, a change in distribution of albumin and globulin was established. Since the physiologic and clinical consequences of disturbances in the serum proteins depend on the actual concentrations of the albumin and globulin fractions. I urge that emphasis be placed on these rather than on their ratio. This can be explained as follows. An albumin globulin ratio of 0.5 is obtained when the albumin is 1.5 gm. and the

globulin is 3 gm. The same ratio is present when the albumin is 3 gm and the globulin is 6 gm. It is obvious that the decrease in albumin is the striking feature in the first instance, and that an extraordinary increase in globulin results in the same ratio in the second instance. Certainly the physiologic, diagnostic and clinical implications are totally different despite identical ratios.

From the standpoint of the clinician, patients with disturbances in serum proteins may be separated into two categories: those in whom hypoalbuminemia and its consequences dominate the disease picture, and those in whom hyperglobulinemia is the outstanding abnormality. To this generalization may be added a corollary. Thus, abnormalities in the albumin fraction always occur in the direction of a decrease, whereas significant changes in the globulin fraction are associated with increases in these proteins. Albumin values greater than 55 gm. indicate either that dehydration or an abnormally soluble globulin is present. The presence of an abnormal globulin under these circumstances can be verified if the results obtained by the salting-out method,²⁶⁻²⁷ are compared with those obtained by the Tiselius or immunochemical techniques of analysis. Although there is a sound physiologic and chemical basis for segregation of patients into these categories of hypoalbuminemia and hyperglobulinemia, it must be recognized that an outstanding disturbance in one protein fraction is often accompanied by some change in the other. For example, the serum albumin in a patient with cirrhosis of the liver may be reduced to 25 gm per 100 cc, and at the same time the globulins may be increased to 5 gm. Or, in a patient with lymphogranuloma inguinale, as shown by Gutman et al.,²⁸⁻²⁹ the characteristic hyperglobulinemia is often associated with some degree of hypoalbuminemia.

The causes for hypoalbuminemia can be divided into three general groups: inadequate protein intake, excessive protein loss and failure of albumin regeneration. These groups of disturbances with their subdivisions are shown in Table 2.

Since the clinical importance of disturbances in serum albumin is dependent on its normal functions, these should be reviewed briefly. The serum albumin normally acts to maintain the effective osmotic pressure of the blood plasma, to maintain normal plasma volume, to serve as a source of energy in starvation, and to serve as a chemical buffer. The most important physiologic and clinical consequences of hypoalbuminemia depend primarily on a disturbance of one of these normal functions, namely, that of maintaining osmotic pressure. This activity follows from the fact that the albumin molecules traverse the capillary walls

only in small amounts under normal conditions. Although this lack of permeability is also characteristic of the globulins, they exert but one fifth of the osmotic pressure of the albumin fraction in normal serum. The greater osmotic activity of the albumins results from their smaller molecular weight and their higher concentration in the serum. The difference in osmotic activity of the

TABLE 2 Factors Causing Hypoalbuminemia

INADEQUATE PROTEIN INTAKE	
Economic causes (hunger edema)	
Poor appetite	
Any protracted illness	
Cardiac decompensation	
Chronic alcoholism	
Mechanical interference with food intake	
Poor intestinal absorption (?)	
EXCESSIVE PROTEIN LOSS	
Recent hemorrhage	
Massive chronic supuration	
Exfoliation of skin (severe burns)	
Uncontrolled diabetes mellitus	
Nephrotic state	
Varicose ulcer or stomas	
Repeated abdominal taps	
FAILURE OF ALBUMIN SYNTHESIS	
Chronic parenchymal liver disease	
Nephrotic state	
Cardiac edema with chronic passive congestion	
Prolonged protein starvation (?)	

albumins and globulins in the blood is further accentuated by virtue of differences in their isoelectric points. These differences favor greater ionization and therefore greater osmotic properties of albumin at the pH of the blood.

Decreasing concentrations of albumin lead to a diminishing tendency for interstitial fluid to be brought back into the capillaries. In hypoalbuminemia, when the osmotic activity of the serum proteins at the venous end of the capillaries is less than the hydrostatic pressure, edema fluid will accumulate. This idea is in accord with the Starling hypothesis, the validity of which was established by the direct measurements of Landis.³⁰ Various workers have found that edema fluid tends to accumulate when the serum albumin concentration falls below a so-called "critical level." Thus, Moore and Van Slyke³¹ observed that edema was usually present in patients in whom the serum albumin concentration was less than 25 gm per 100 cc. In malnutrition, Bruckman and Peters³² state that edema almost always develops when the albumin falls below 3 gm per 100 cc. It is essential, however, to emphasize that other factors, such as the intake of sodium salts, the local renal factors of blood flow, glomerular filtration pressure, tubular reabsorption and tissue pressure, as well as unknown factors, may be of considerable importance. Thus, the rigid restriction of sodium salts tends to limit edema formation even in the presence of very low serum albumin concentrations. Also, striking diuresis may at times occur for

wholly unexplained reasons when the concentration of serum albumin is maintained well below the critical level.

From the foregoing discussion, it is apparent that marked hypoalbuminemia is characterized clinically by the physiologic tendencies that it may initiate. This is not true of hyperglobulinemia, the causes of which are presented in Table 3. The

TABLE 3. *Diseases Associated with Hyperglobulinemia.*

INFECTIONS	
Lymphogranuloma venereum*	
Eosinophilic granuloma*	
Lupus erythematosus disseminatus*	
Periarteritis nodosa	
Subacute bacterial endocarditis	
Rheumatoid arthritis	
Leprosy	
Kala azar*	
Many other infections	
NEOPLASMS	
Multiple myeloma*	
Lymphoblastoma	
Leukemia	
METABOLIC DISORDERS	
Cirrhosis of liver*	
Cardiac failure (chronic passive congestion)	
NO RECOGNIZED DISEASE	
Occasional young Negroes	

*Hyperglobulinemia often marked, that is, over 4.5 gm. per 100 cc.

heterogeneous groups of diseases in which increases in the globulin fraction of the serum occur include infections, tumors and metabolic disease. Hyperglobulinemia is also present at times in young Negroes who are otherwise apparently normal. No common underlying mechanism or mechanisms are as yet recognizable in these groups, although increases in serum globulins are often encountered in diseases in which plasma-cell reactions are prominent. The importance of hyperglobulinemia is, perforce, at the present time limited to its diagnostic value. This statement is not designed to detract from the clinical value of serum globulin determinations as an aid to diagnosis, but merely emphasizes the unsatisfactory state of knowledge concerning the physiologic interpretation of changes in the globulins. It is apparent from Table 3 that marked hyperglobulinemia, that is, values of more than 4.5 gm., occurs in but a limited number of diseased states and should therefore direct attention toward them. When hyperglobulinemia is of only moderate intensity, that is between 3.0 and 4.5 gm., the specificity of the disturbance is obviously reduced, and mild degrees of hyperglobulinemia are observed in an extraordinary variety of infections.

In addition to the diagnostic value of total globulin determinations, Gutman³³ has recently pointed out the usefulness of fractionation of the globulins. When the total concentration of globulin is increased, the euglobulin participates in the change with great regularity. In multiple

myeloma, however, the euglobulin may not exceed its normal concentration of 0.1 to 0.2 gm. per 100 cc. Thus when a moderate or marked increase in total globulin is present and the euglobulin is not increased, Gutman has shown that the diagnosis of myeloma, which is often exceedingly difficult in the early stages, becomes relatively certain.

USES OF PLASMA PROTEINS IN THERAPY

It seems appropriate to end a survey devoted to the plasma proteins with a consideration of their role in therapy. Plasma protein or serum protein transfusions are recommended today in the treatment of two disorders, namely, hypoalbuminemia and the state of shock. These protein transfusions are employed instead of whole blood because they may, at least theoretically, have a greater effect in restoring the plasma protein levels to normal, in increasing and maintaining an increase in the circulating plasma volume, in initiating diuresis in hypoalbuminemic states associated with edema by virtue of raising the osmotic activity of the plasma and thereby increasing the plasma volume, and in making available a utilizable source of energy in states of undernutrition.

In the hypoalbuminemic state dependent on inadequate protein intake, the therapeutic implication appears to be an increase in the dietary protein. When this aim cannot be achieved, the daily infusion of casein autolysates should be the next therapeutic method of choice. When these methods fail, it is probably justifiable to employ plasma or serum transfusions, but it should be emphasized from the economic standpoint that, in this type of case, plasma transfusions constitute a true luxury. The same recommendations apply to the treatment of hypoalbuminemic states due to excessive protein loss. One notable exception must, however, be made. Thus in severe burns when shock is largely dependent on acute plasma loss, plasma or serum transfusion becomes the emergency procedure of choice.

It is in patients whose hypoalbuminemia is associated with the nephrotic state that plasma or serum transfusions are most frequently recommended. The hope in plasma or serum transfusions probably arises from the sound logic of the procedure in a group of patients in whom high-protein diets and casein autolysate infusions have been notoriously ineffective in stimulating serum albumin regeneration. Dramatic diuretic results have been reported by Aldrich and his associates^{34, 35} in the treatment of nephrotic edema with lyophil serum. The experience of others has been less successful and suggests that the di-

uretic effects obtained were to be associated more with nonspecific reactions than with the concentrated plasma itself. My experience with plasma transfusions in nephrotic patients at the Presbyterian Hospital has been limited and truly disappointing. The following brief report is representative. A nephrotic boy, whose serum albumin was 1.3 gm. per 100 cc. before treatment, was given 2000 cc. of normal human plasma in the course of three days. It might have been anticipated that this amount of plasma would raise his serum albumin to at least 3.5 gm. In reality the serum albumin after three days was only 1.5 gm., and no diuresis occurred. The albumin transfused was either excreted in the urine or utilized as food, but it had none of the desired effects. Thus plasma transfusion in the nephrotic state is not so successful as has been hoped, but is well worth further trial, particularly if given in two to four times its normal concentration.

In the treatment of shock, the value of plasma and serum proteins has been demonstrated beyond question. There continues to be uncertainty concerning details of the best means of preparation, the optimal concentration for use and the relative values of plasma and serum. The fact that some disagreement and confusion exist concerning these details should in no way detract from the fundamental value of this type of therapy.

* * *

An attempt has been made to indicate the direction in which progress in knowledge of the problems of the serum proteins is being made. It is both interesting and significant that advances in understanding the physiologic aspects of these problems have developed simultaneously with the acquisition of empirical knowledge, which has, nevertheless, already been shown to have an important application in the practice of medicine. Thus knowledge of the mechanisms and diagnosis of disease has been enhanced materially.

REFERENCES

- Owain, A. A. *Original Papers of Richard Bright on Renal Disease* 172 pp. New York and London Oxford University Press 1937
- von Behring, E. Untersuchungen über das Zustandekommen der Diphtherie Immunität bei Thieren. *Deutsche med Wchnschr* 16 1145 1148 1890
- Starling, E. H. On the absorption of fluids from the connective tissue spaces. *J Physiol* 19 312 326 1896
- Morawitz P. cited by Epstein²⁴
- Bergmann M. Proteins and proteolytic enzymes. *The Harvey Lectures*, 1935 36 255 pp. Baltimore Williams & Wilkins Co., 1936 Pp 37 56
- Svedberg T. and Pedersen K. O. *The Ultracentrifuge* 488 pp. New York and London Oxford University Press 1940
- Hardy W. B. On the coagulation of protein by electricity. *J Physiol* 24 288 304, 1899
- Meachels, L. cited by Tiselius⁹
- Tiselius A. Electrophoretic analysis and the constitution of native fluids. *Bull New York Acad Med* 16 751 780 1940
- Longworth L. G. Sheldovsky T. and MacInnes D. A. Electrophoretic patterns of normal and pathological human blood serum and plasma. *J Exper Med* 70 399 412 1939
- Longworth, L. G. and MacInnes D. A. An electrophoretic study of nephrotic sera and urine. *J Exper Med* 71:77 82, 1940
- Pholpot J. St. L. Direct photography of ultracentrifuge sedimentation curves. *Nature* 141 283 1938
- Heidelberger M. Protein constitution and immunological behavior. *Cold Spring Harbor Symposia on Quant Biol* 6 369 375 1938
- Kendall F. F. The use of immunochemical methods for the identification and determination of human sera proteins. *Cold Spring Harbor Symposia on Quant Biol* 6 376 384, 1938
- Goetsch E. and Kendall F. E. Analysis of albumin and globulin in biological fluids by the quantitative precipitation method. *J Biol Chem* 109 221 231, 1935
- Goetsch E. and Lyle J. D. Precipitation studies in nephrosis and nephritis. *J Clin Investigation* 19 9 24 1940
- Madden S. C. and Whipple G. H. Plasma proteins: their source production and utilization. *Physiol Rev* 20 194 217, 1940
- Kerr W. J., Hurwitz S. H. and Whipple, G. H. Regeneration of blood serum proteins. II Influence of diet upon curve of protein regeneration following plasma depletion. *Am J Physiol* 47:370 378, 1918
- Elman R. and Heifetz, C. J. Experimental hypalbuminemia: its effect on the morphology function and protein and water content of the liver. *J Exper Med* 73 417 430 1941
- Weed A. A. The significance of the albumin fraction of serum. *Bull New York Acad Med* 15 63 91 1939
- Patek J. and Post J. personal communication
- Sabin F. R. Cellular reactions to a dye protein with a concept of the mechanism of antibody formation. *J Exper Med* 70 67 82 1939
- Burroughs F. W., Burroughs H. S. and Mitchell, H. H. The amino acids required for the complete replacement of endogenous losses in the adult rat. *J Nutrition* 19 363 384 1940
- Epstein A. A. Contribution to the study of the chemistry of blood serum. *J Exper Med* 16 719 731, 1912
- Idem. Concerning the causation of edema in chronic parenchymatous nephritis method for its alleviation. *Am J M Sc* 154 638 647, 1917
- Howe P. E. The use of sodium sulfate as the globulin precipitant in the determination of proteins in blood. *J Biol Chem* 49 93 107, 1921
- Robinson H. W., Price J. W. and Hodgden, C. G. The estimation of albumin and globulin in blood serum. I. A study of the errors involved in the filtration procedure. *J Biol Chem* 120 481 498 1937
- Williams R. D. and Gutman A. B. Hyperproteinemia with reversal of the albumin globulin ratio in lymphogranuloma inguinale. *Proc Soc Exper Biol & Med* 34 91 94, 1936
- Gutman A. B. Gutman F. B., Jilston R. and Williams, R. D. Acid base equivalence of the blood in diuresis associated with hyperglobulinemia with special reference to lymphogranuloma inguinale and multiple myeloma. *J Clin Investigation* 15 475-484 1936
- Landis F. M. The passage of fluid through the capillary wall. *The Harvey Lectures* 1936 37 245 pp. Baltimore Williams and Wilkins Co., 1937 Pp 70 91
- Moore N. S. and Van Slyke, D. D. The relationships between plasma specific gravity, plasma protein content and edema in nephritis. *Clin Investigation* 8 337 355 1930
- Bruckman F. S. and Pelets J. P. The plasma proteins in relation to blood hydration. V. Serum proteins and malnutrition or cachectic edema. *J Clin Investigation* 8 591 595, 1930
- Gutman A. B. personal communication
- Aldrich, C. A. and Boyle, H. H. Concentrated human blood serum as a diuretic in nephrosis: further observations. *J A M A* 114 1062 1065 1940
- Aldrich G. A., Stokes J., Jr., Killingsworth, W. P. and McGuinness A. C. Concentrated human blood serum a diuretic in the treatment of nephrosis. *J A M A* 111 129 133, 1938

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTI-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27231

PRESENTATION OF CASE

First Admission. A sixty-year-old woman entered the hospital for study.

Approximately one year before admission, the patient was treated in this hospital for erysipelas of the face, and during the routine examination a slightly tender, hard, irregular mass was palpated in the mid-epigastrium; it did not move with respiration. A gastrointestinal series revealed no evidence of intrinsic disease in the esophagus, stomach or duodenum. An extrinsic pressure defect on the medial side of the stomach corresponded to the mass felt through the abdominal wall. This mass was believed to be the left lobe of the liver, although the organ as a whole was not enlarged; the spleen was small.

Second Admission. A year passed before the patient again entered the hospital for an investigation of the mass. She had lost 6 pounds during the preceding few months, but even leading questions failed to uncover any subjective symptom.

On examination the patient was well developed and well nourished. The heart and lungs were normal, the blood pressure 160 systolic, 80 diastolic. The abdomen was soft, and an orange-sized, hard, nontender mass was palpable in the umbilical region, with its lower border on a level with the umbilical line. It was freely movable and moved with respiration. The right kidney was palpable; the liver was not.

The temperature, pulse and respirations were normal.

Examinations of the urine, stools and blood were negative. The nonprotein nitrogen of the blood serum was 20 mg. and the proteins 6.5 gm. per 100 cc.; the blood Hinton reaction was negative.

A gastrointestinal series showed a normal esophagus. The stomach was elongated and low in position but showed no defects, and the duodenal cap and loop were not remarkable. The palpable mass lay medial and posterior to the upper stomach, producing a pressure defect on the posterior wall at the junction of the upper and middle thirds. There were many small gallstones and one larger stone, apparently in the cystic duct.

A barium enema passed readily to the cecum and entered the terminal ileum. The colon showed a few diverticula in the region of the sigmoid, but otherwise was not remarkable. The palpable mass lay above and medial to the splenic flexure.

An operation was performed on the third hospital day.

DIFFERENTIAL DIAGNOSIS

DR. EDWARD L. YOUNG: Our problem is the diagnosis of a mass that is known to have existed for at least a year in a woman of sixty and to have grown during that period without affecting her general health or causing any subjective symptoms. The possibilities of a mass in that region come down to a definite number. The mass was apparently retroperitoneal and outside the gastrointestinal tract, according to the x-ray evidence. That leaves us with the possibility of a retroperitoneal tumor of lymphoid origin, a tumor coming from the left kidney or adrenal and a tumor of the pancreas. From the description, it should not have been from the liver, for instance an echinococcal cyst or an abnormal left lobe, and it should not have been from the spleen. The spleen was noted as being normal the previous year. I am sorry that there is no note in this record about whether the mass went through to the flank on palpation. This always suggests a kidney tumor. I think that the feel of a tumor such as this helps very much in connecting it with the kidney. Nothing abnormal was found in the urine. Moreover, there is no evidence of any study of the urinary tract, and we may therefore assume that the examiners were fairly sure that the mass was not renal in origin.

The question of pancreatic tumor comes up. The pancreas is a retroperitoneal fixed organ. When this mass was first felt, it was described as irregular but not movable. Of course the question of movability of a pancreatic tumor depends on the part of the pancreas from which it arises, and whether or not it is in contact with the liver, which must move on respiration. The commonest tumor of this size in the pancreas is, of course, a cyst, probably of the tail of the organ. It could move with respiration, but I must confess it is not usual.

Was it possibly a cyst of mesenteric origin? It could not be an omental cyst, of course, and make a defect in the posterior wall of the upper medial part of the stomach. I suppose it is possible for a cyst of the mesocolon to develop in such fashion as to make a defect as described in the x-ray report. That would be more freely movable than a pancreatic cyst.

Without getting any help from the x-ray findings, but merely going on what is given here, it is a little difficult for me to make a differential diagnosis between a cyst of the mesentery and a pancreatic cyst. Pancreatic cysts are very uncommon. Up to 1936,—I think I looked them up at that time,—there had been only 5 in sixteen years at the Massachusetts General Hospital. I believe the Mayo figures were more than 80 cases out of 750,000 patients, so that it is not common. Mesenteric cyst likewise is not common, and my belief is that they do not show themselves to be quite so large as this mass was. I should like to "stick my neck out" and say this is a pancreatic cyst first, in spite of the movability. Mesenteric cyst is second. I do not believe it is connected with the kidney or adrenal, and I do not believe it is connected with the liver. I should like to allow myself a chance to change my opinion after Dr. Holmes clears everything up.

DR GEORGE W. HOLMES: Unfortunately, the evidence that I have here does not clear anything up. As a matter of fact, all one can be certain about is that there is nothing wrong in the stomach. I should think the description would lead you to suspect that the man who examined the case thought the tumor was in the region of the pancreas.

DR YOUNG: Of course the thing to do, if it is a pancreatic cyst, is to take it out if possible. Such cysts may be simple; they may be malignant. Even if they are simple, they may have to be marsupialized because of the impossibility of taking them out. If they are malignant, the effort should certainly be made to remove them.

CLINICAL DIAGNOSIS

Carcinoma of the gall bladder.

DR YOUNG'S DIAGNOSIS

Pancreatic cyst

ANATOMICAL DIAGNOSIS

Papillary adenocystoma of the pancreas

PATHOLOGICAL DISCUSSION

DR TRACY B. MALLORY. This patient was operated on by Dr. Claude E. Welch, who split the gastrocolic omentum and came immediately down on a cystic structure. He was at first unable to decide which organ it was attached to, but it proved fairly readily mobilizable, and when he brought it farther up into the wound it became clear that it was attached to the pancreas. He was able to remove it without too much difficulty, and then found that in doing so he had completely

removed the middle section of the pancreas. He therefore went back and removed the distal fragment of the pancreas, to be on the safe side. This distal fragment was atrophied, and when it was cut across, a widely dilated pancreatic duct was found, with practically no recognizable pancreatic tissue. Microscopic sections showed total atrophy of the acinar cells, but the islands were perfectly preserved. It was exactly equivalent to the type of atrophy that develops from ligation of the pancreatic duct in an experimental animal. The cyst itself was 6 cm in diameter and was multilocular, consisting of multiple cavities varying from pinpoint in size up to a centimeter or more in diameter. In a great many of these cavities, papillary projections were found, and we must classify this definitely as a neoplasm, a papillary adenocystoma of the pancreas. Whether it is benign or malignant is a little difficult to be sure of. We have seen one case of this sort, which Dr. Young perhaps remembers, since it was his originally, of frankly malignant papillary carcinoma of the pancreas. That recurred after a considerable interval, seven years, I believe. This tumor in comparison looks much less malignant. I think it is quite possible that the patient was cured, but I should not be surprised at a delayed recurrence.

DR YOUNG: This interests me, because when you reviewed the slides of the original case you believed it was papillary cystadenoma and non-malignant. It was first reported as malignant, and the patient did well and apparently was cured. It recurred six and a half years later, and she died seven and a half years after the original operation.

CASE 27232

PRESENTATION OF CASE

A forty three year-old housewife entered the hospital complaining of abdominal pain.

The patient had felt perfectly well until one year before admission, when she noticed that she was becoming pale, rather weak, tired easily and was slightly dyspneic on exertion. No localizing symptoms appeared until three months before admission, at which time a sharp pain developed in the right upper quadrant of her abdomen, radiated to the right shoulder blade, and was aggravated by breathing and lying on her back. Shortly thereafter, the pain also included the epigastric region, and six weeks later it developed in the left lower quadrant, where it was stabbing in character and slightly increased by respiration. The pain became constant, and the patient went to bed suffering from anorexia and a considerable increase in exertional dyspnea. One month before admis-

sion, a loss in weight was first noticed and, in addition, an increase in the size of her abdomen. The husband believed the patient to be a little jaundiced, but no color change was noticed in the stools or urine. Two and a half weeks before admission, examination showed an enlarged liver and spleen. Gradually her dyspnea became more marked, and the right upper-quadrant pain exaggerated. One week before entry the patient was admitted to another hospital, where x-ray films were taken. At no time had there been nausea, vomiting, cough, urinary changes or vaginal bleeding. She had lost 20 pounds in weight.

The patient's father had died of carcinoma of the esophagus. The past illnesses were noncontributory.

On examination the patient was flushed and appeared chronically ill, and there was evidence of recent weight loss. The heart was normal, the blood pressure 130 systolic, 80 diastolic. At the left lung base, there were diminished excursion, slight percussion dullness and diminished breath sounds. The abdomen was distended and tympanic, and an occasional peristaltic sound was heard. No shifting dullness was elicited. A tender edge, believed to be liver, was felt in the right upper quadrant and in the epigastrium. The spleen was not palpable, but percussion dullness over the region of the spleen could be made out. Rectal and pelvic examinations were negative.

The temperature was 99°F., the pulse 100, and the respirations 30.

The urine showed a + test for albumin, with an occasional white blood cell per high-power field and many bacteria in the sediment. The blood showed a red-cell count of 3,300,000 with a hemoglobin of 10.9 gm. (photoelectric-cell technic), and a white-cell count of 8600 with 82 per cent polymorphonuclears. A blood film showed considerable marrow activity with increased platelets, some shift to the left in the polymorphonuclears, stippled and polychromatophilic red cells and a few immature unidentified cells. The nonprotein nitrogen of the blood serum was 27 mg. per 100 cc.; the blood Hinton reaction was negative. The stools were normal.

X-ray films of the gastrointestinal tract taken in another hospital were interpreted as showing flattening of the greater curvature of the stomach due to pressure from what was believed to be an enlarged spleen. The stomach emptied in six hours; the colon was low and atonic. A barium enema revealed no significant findings. With a Graham test no dye entered the gall bladder. The genitourinary tract was normal.

A flat plate of the abdomen taken in this hospital showed a large collection of gas in the left

mid-abdomen having the shape of the stomach antrum. There also appeared to be some gas-filled loops of small bowel in the mid-abdomen, but no dilated loops were visualized.

An electrocardiogram showed sinus tachycardia, low voltage in QRS, left-axis deviation and total inversion of Lead 3. T₁ and T₂ were tall and upright, and T₃ was inverted. Lead 4 was normal, save for low diphasic T waves.

On the third hospital day an operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. LELAND S. MCKITTRICK: It seems to me that the man who operated on this patient was a far better diagnostician than I am, or that he had some information I do not know of. I should not know what in the world to operate for. Here is a woman of forty-three, with pallor, weakness and slight dyspnea on exertion, who tired easily. Sometimes in carcinoma of the stomach or cecum there is such severe anemia that the patients get short of breath and have the other symptoms that go with inadequate oxygenation of the tissues. But that is not an outstanding surgical symptom. The patient was evidently not well for a long period, but nothing definite came into the picture until three months before admission, when she had sharp pain in the right upper abdomen radiating to the shoulder blade, aggravated by breathing and by lying on her back. I suppose that means something, but I cannot figure it out. Another point that is intriguing and confusing to me is that the pain became constant in the left lower quadrant, and that the patient went to bed suffering from anorexia and considerable increase in exertional dyspnea. She had had weight loss and possibly a little jaundice; there was no suggestion of it on physical examination. She had increase in the size of her abdomen. She is said to have had a palpable spleen two and a half weeks before admission, but x-ray films taken on the outside were essentially negative. I think it might be best to see the x-ray films now.

DR. GEORGE W. HOLMES: I am afraid that I am not going to help you. At first glance, one wonders how they could interpret this shadow as gas in the stomach. These films, I presume, were taken with the patient lying on her back. It is hard to tell. The striking thing is that there is no gas in the upper abdomen. One cannot see the diaphragm. If I could tell you whether the fundus of the stomach was displaced forward or backward, it would help a great deal in deciding whether the mass was liver or spleen. It must be either a very large liver or spleen or a very large mass.

Dr. McKITTRICK: In addition to what Dr. Holmes has said, we learn from the record that the patient has a positive Graham test. I am trying to find a surgical lesion, but not with much success. She may or may not have had gallstones. Certainly, they are not what she came into the hospital for. Apparently she had a large liver, and presumably a large spleen. That again is against a surgical lesion of a primary nature. The discomfort she had was certainly not characteristic.

In summary, we have a forty-three-year-old woman who had symptoms that went back a year, beginning with pallor, weakness, fatigue, and dyspnea on exertion. Three months before admission, pain came into the picture. The patient was distended, had supposedly a large liver and a large spleen, and her gall bladder did not fill. What this elaborate report on the blood means, I am ashamed to say, I do not know. I shall have to disregard it. The heart was normal on physical examination, and, Dr. Bland tells me, essentially normal in the electrocardiogram. Therefore, the dyspnea on exertion was probably not due to any heart abnormality. This woman, I believe, had either biliary-tract or neoplastic disease. It seems to me that neoplasm along the gastrointestinal tract has been reasonably well excluded by x-ray study. Carcinoma of the pancreas one might consider because of the steady constant pain that she had when she entered the hospital. The large spleen is not very satisfactorily explained on that premise, although I have seen large spleens from metastasis secondary to carcinoma of the pancreas. The distention, I suspect, was due to fluid in the abdomen, in addition to an excess of gas such as one sees in carcinomatosis or in cirrhosis. The rectal examination was negative. In other words, no nodule was felt in the pelvic floor. Somehow, I am inclined to believe that this may well not have been a carcinomatous mass with a carcinomatosis. I suppose one always has to consider, in the presence of unexplained abdominal findings, the question of Hodgkin's disease with involvement of the liver and of the spleen and possibly with retroperitoneal glands. I do not believe that the patient had a surgical lesion. I am going to put as my first impression cirrhosis of the liver, although there is nothing in the record to warrant any suggestion as to its etiology. The second guess that I can make would be a malignant lymphoma, and from there on it would be an open field.

Dr. EDWARD L. YOUNG: Do you think peritoneoscopy would have helped?

Dr. McKITTRICK: I think it would have been a great deal of help.

Dr. WILLIAM B. BREED: I should like to ask Dr. Richardson about the blood.

Dr. WYMAN RICHARDSON: I looked at the blood. May I read my notes? I saw the patient a short time before the answer was discovered and made the following notes:

The abdomen is very much distended and tympanitic. I cannot make out any large amount of fluid. There is no general glandular enlargement. Blood smear shows considerable marrow activity, with increased platelets, some shift to the left of polymorphonuclears; stippled and polychromatophilic red cells and a few very immature and unidentified cells are present. The clinical and blood picture, to me, rules out cirrhosis of the liver and Banti's disease (thrombosis of the splenic vein). The most probable diagnosis is malignant disease of some sort, with "myelophthisic" anemia most probable. Leukemia is not excluded. There is a question of intestinal obstruction. I have considered tuberculosis, but this is not likely. Further study should include a flat plate of the abdomen, peritoneoscopy and possibly bone-marrow biopsy if no definite diagnosis is established.

I might say I thought before this problem was answered that the patient had carcinoma of the pancreas, with metastases. I should like to add one word: A blood picture that shows this amount of marrow activity with immature red cells and immature white cells is not compatible with anemia from cirrhosis of the liver or even from hemorrhage. It means, then, some active marrow disease, and it is not infrequently seen in severe neoplasm, especially when the liver is very much involved.

CLINICAL DIAGNOSES

Malignant disease.
Myelophthisic anemia.

Dr. McKITTRICK'S DIAGNOSES

Cirrhosis of liver.
Malignant lymphoma.

ANATOMICAL DIAGNOSES

Carcinoma of gall bladder, with extension to liver and metastases to lung, hepatic, retroperitoneal and bronchial lymph nodes.
Pulmonary collapse, lower lobes, bilateral.
Ascites.
Arteriosclerosis, aortic and coronary, slight.

PATHOLOGICAL DISCUSSION

Dr. TRACY B. MALLORY: I think possibly the statement in the record that operation was performed is misleading. The operation was peritoneoscopy. Dr. Edward B. Benedict is not here to describe his findings, but it was obvious at a glance that the liver was filled with metastases.

The patient rapidly failed and died. At the time of autopsy, the entire upper abdomen was filled with liver. There were 5 kilograms of it. The spleen was not significantly enlarged, weighing 270 gm., which is not palpable enlargement. The particular portion of the liver that was most enlarged was the left lobe, and it was unquestionably that which was felt and interpreted as the spleen. The enlargement of the left lobe I am sure was quite sufficient to account for the abnormality on x-ray examination. The gall bladder at first glance seemed normal, although a little dilated. The anterior wall was thin. When it was cut into, it contained a large amount of clear, colorless fluid. On the posterior wall, in the bed adjacent to the liver, was a fungating cauliflower mass. This unquestionably was a primary carcinoma of the gall bladder that extended directly into and almost completely replaced the liver. The amount of liver parenchyma left was under 500 gm., I should think.

DR. McKITTRICK: Dr. Holmes really gave away what he had in the back of his mind. He gave me quite a tip-off when he stressed the density

in the upper abdomen, because it would be quite hard to explain the combination of that density with the location of the gas bubble on any other basis. Do you ever get as large a liver as that in either cirrhosis or lymphoma?

DR. MALLORY: Yes; in both. Five kilograms of liver are not extremely rare in early stages of alcoholic cirrhosis.

DR. McKITTRICK: Do you usually get a diffuse enlargement, or is it apt to be more or less localized to one lobe?

DR. MALLORY: That is unusual in cirrhosis, but is certainly not uncommon in cancer.

DR. McKITTRICK: I think I should have done better with Dr. Holmes's interpretation of the x-ray films.

DR. RICHARDSON: And the blood smear.

DR. HOLMES: If you could have been sure that the fundus of the stomach was displaced backward instead of forward, you could be certain it was liver and not spleen.

DR. MALLORY: I agree with Dr. Richardson's point. The blood picture was an excellent lead.

The New England Journal of Medicine

Formerly the

Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of

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SUBSCRIPTION TERMS: \$6.00 per year in advance postage paid for the
United States; Canada \$7.04 per year; Boston funds \$3.52 per year for all
other countries belonging to the Postal Union.

MANUSCRIPTS for early publication should be received not later than noon
on Saturday.

THE JOURNAL does not hold itself responsible for statements made by its
contributors.

COMMUNICATIONS should be addressed to the New England Journal of
Medicine, 8 Fenway, Boston, Massachusetts.

THE CLOSED-STAFF HOSPITAL

It was not very long ago—about the turn of the century—when those members of the public who required more than office care from their physicians or surgeons turned away with suspicion whenever hospital care was suggested. This attitude, doubtless, was only a later expression of the justifiable fear that existed in the "Sairy Gamp" era when hospitals were either poorhouses or institutions for the insane and those suffering from chronic alcoholism. Brought up to date, this fear expressed itself in terms of dread of "unnecessary cuttings," "experimentation by students" and the like. It forced the members of the medical profession to compromise their ideals and to care for their major obstetric, medical and surgical problems in private homes, pending education of

the public to the advantages of hospitalization. Thanks to the advancement in the science as well as the practice of medicine, the increased use of hospitals as teaching centers, the development of new ideas in the management and training of the house staffs in the hospitals but, most of all, to the mental acuity of the patients and their families, this education was sufficiently far advanced so that hospitalization was not only accepted but demanded by seriously ill patients at the time of the outbreak of World War I.

With this increased use it was shortly apparent to the profession that there were illegitimate as well as legitimate advantages to having a hospital to call on. Such evils as therapy—particularly surgical—without diagnosis, inadequate and incompetent medical care, the blocking rather than the facilitation of post-mortem examinations, the neglect of records, with resulting medicolegal complications and injustices, and many unethical financial arrangements between unscrupulous physicians and surgeons became commonplace and were rapidly undoing all the educational good that had been accomplished with so much effort.

Some disciplinary measures were essential. Because the surgeon had the greater and more dramatic opportunity to fall by the wayside, corrective action was first taken by this branch of the profession. This led to the formation of the American College of Surgeons. Over the intervening years since its organization, this and other societies—backed by the financial support of an enlightened public—have evolved a method whereby a maximum of control is exercised over those persons and tendencies in the medical profession that consciously or unconsciously threaten to bring back the evils mentioned above. This has been accomplished by keeping the services rendered by both the hospitals and the visiting staffs at the standard that is acceptable to the majority of doctors. Such hospitals as meet these standards are rewarded by certification of acceptability. This is inevitably followed by an improvement in the caliber of their resident staffs, an easing of their financial burdens through willingness of patients to pay more and promptly.

and an encouragement to their trustees in obtaining public support for their efforts to protect the local communities.

Furthermore, this certification leads to the requirement of the hospital that the work and medical morals of the visiting staff be kept at a high level. To accomplish this the hospitals—for their own self-protection—have created the closed-staff and courtesy-staff organization and denied to such members of the medical profession as were either unwilling or unable to conform to the minimum standards set up by the American College of Surgeons and other analogous institutions the right to practice or care for patients within their walls. Those physicians and surgeons who are allowed membership on such closed or courtesy staffs are universally favorable to the arrangement and rightly jealous of their professional and ethical standards. In the light of the present-day attitude of the public, as represented by their financial support of such hospitals, by their patronization of such staff members and by their demand for such facilities in cases of serious illness, it is apparent that this movement meets with the approval of the intelligent part of the patient population.

Physicians and surgeons who have not been granted these privileges are prone to cry favoritism, graft in high places, coercion and so forth. They either ignore or know nothing of the historical background that led to the present-day arrangement. In particular they fail to recognize that any member of the medical profession, regardless of the school from which he graduated or the societies to which he belongs, who can demonstrate to fellow members in his community, and to the trustees of the hospital that serves his community, that he is technically equipped, adequately trained, ethical and desirous of keeping constantly up to date in his profession will have no difficulty in obtaining permission to practice in his local hospital, even though it is inspected and certified as meeting the minimum requirements of the American College of Surgeons. They must not forget that such certification has the actual or implied support of the American Col-

lege of Physicians, the American Hospital Association, the American Nursing Association, the American Red Cross and similar organizations. Attempts to camouflage inadequacy, incompetence or lack of ethics under the specious plea that membership in a state medical society automatically negates the considered judgments of the doctors peers are doomed to failure and are indefensible.

X-RAY EXAMINATION OF RECRUITS

It seems quite clear from the article on "Tuberculosis and Mobilization" in this issue of the *Journal* that the National Tuberculosis Association has made significant recommendations regarding the elimination of tuberculosis in those selected for service in the forces of the United States. It has recommended that Washington order x-ray examination of the lungs to be carried out by the local selective-service boards, thus rooting out tuberculosis at the source, with a consequent saving of time and money. Secondly, it points out that if examination is put off until the appearance of the candidate before the induction board, enrollment into the service should be delayed until the result of the examination is known. Both recommendations are sound.

It is pertinent to consider what x-ray technic is best suited for such a survey of recruits. Miniature films are becoming increasingly popular in mass-survey work. The 35-millimeter and 4-by-5-inch films are both photographic reproductions of the image thrown on a fluoroscopic screen, and the procedure is known as fluorography. The initial cost of equipment is high, but the cost per picture very low,¹ being at least one tenth that of the standard 14-by-17-inch film. But factors other than expense influence the decision of the best technic.

It has recently been shown that in carefully studied series of x-ray examinations 4-by-5-inch films failed to reveal 2.6 per cent of the cases of tuberculosis diagnosed by means of standard films.^{2,3} In a survey of a million recruits, assuming the incidence of tuberculosis to be 1.0 per cent, examination by the miniature film on this

basis would fail to show 260 small lesions in the lung. The small lesion that is unrecognizable by physical examination presumably represents active tuberculosis, and is therefore potentially a source of danger to the candidate as well as to those associated by contact with him. Further research will undoubtedly perfect the accuracy of the miniature film, but so long as an error of 2.6 per cent persists in the hands of competent observers its adoption as a weeding-out procedure does not seem justified.

Spillman⁴ has shown how the eventual cost of missed cases of tuberculosis in World War I has mounted to hundreds of millions of dollars. Since standard x-ray films remain the final word in the diagnosis of pulmonary disease not detectable by the usual physical examination and since most radiologists are not familiar with the interpretation of the miniature reproductions, the chest examination of all recruits by means of 14 by-17 inch films cannot be too strongly urged, in spite of the apparent economy of miniature films.

REFERENCES

1. Tice, P. The miniature x-ray film in the total survey. *J. A. M. A.* 115:1254-1257, 1940.
2. Potter, H. E., Douglas, B. H. and Birkelo, C. C. The miniature x-ray chest film. *Radiology* 34:283-291, 1940.
3. Douglas, B. H. and Birkelo, C. C. The miniature x-ray film of the chest. *Am. Rev. Tuberc.* 43:108-116, 1941.
4. Spillman, R. The value of radiography in detecting tuberculosis in recruits. *J. A. M. A.* 115:1371-1378, 1940.

MEDICAL EPONYM

HOFFMANN'S ANODYNE

Originally one of the secret remedies that Friedrich Hoffmann (1660-1742) dispensed for a consideration, this mixture gradually became a universal pharmacopoeial and popular medicine. The following translated quotation is from the second edition of Hoffmann's *Medicinae Rationalis Systematicae [Theory and Practice of Medicine]* (Vol. III, Sect. II, p. 533, Frankfurt, 1738), "wherein are set forth the true fundamentals of therapy, the process of healing, laws of nature and of medical science, as well as select remedies."

To be sure, I too have resorted fairly frequently to the use of correct opiates. But ever since the fortune of heaven bestowed on me the discovery of this penetrating and pleasant smelling liquid,—with its aromatic taste and odor, formed from a portion of vitriol of sulfur (which, indeed, was used even by chemists of old as an anodyne), by a special chemical formula of preparation,—I have refrained from all others. Now this liquid, which I am accustomed to denote by the

name of liquid mineral anodyne, is formed from sulfur alone. It burns rapidly and fiercely and is consumed, and criches fire very quickly from the flame of a candle even when held away from it a distance of three fingers, and in a warm room it evaporates speedily, yet to the touch it is very cold, just like ice, and when thoroughly distilled and purified it floats on the top of water, just like oil. The uses of this remedy are many, and its virtues varied. It is admirable for soothing pain and inducing slumber, and it is therefore used with great advantage in sharp attacks of colic, stone, cardialgia, gout or pains of head and teeth. It also starts perspiration, and although it is very heating, it does not stir up the blood. Moreover, it leaves no feeling of torpor or weakness in the head, for that reason it can be given with benefit to all invalids when their strength is at a low ebb, as in a hectic fever, and what is even more surprising, with an actual increase in their strength. Finally, because its action is first and foremost on the stomach,—in all stomach disorders, nausea, inflation, hypochondria, asthma and cardialgia,—it shows unequaled effectiveness in putting an end to flatus.

R W B

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., Secretary
330 Dartmouth Street
Boston

ECTOPIC PREGNANCY WITH FATAL TERMINATION

A thirty six year-old primipara began to flow thirty five days after a normal period and flowed for only two days. It was thought that her period was shortened because the patient's feet had become wet. Three days after the flow ceased, she had a severe pain in the lower abdomen, which caused her to perspire freely. She was seen by her family physician.

Examination revealed a temperature of 99.3°F, a pulse of 60 and a blood pressure of 125 systolic, 70 diastolic. The abdomen was soft and nontender. The pain was attributed to menstrual discomfort, and morphine was prescribed. Four hours later, the pain in the lower abdomen had subsided, but there was acute pain in the epigastrium. The temperature at this time was 96.4°F, the pulse 60, and the blood pressure again 125 systolic, 70 diastolic. A telephone conversation four hours later revealed that the patient had vomited and felt much better. She was seen again in four hours, when her pulse was rapid and she was in a serious condition. She was taken to the hospital by ambulance and died on arrival. Post mortem ex-

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

amination revealed rupture of the left tube and much free and clotted blood in the pelvis and abdomen.

Comment. This case emphasizes the importance of appreciating that scanty flow with abdominal pain occurring any time after the expected menstrual date may mean disease and should suggest the possibility of ectopic pregnancy. This indicates immediate pelvic examination. No vaginal examination is reported to have been made in this case. It is really inexcusable that when this patient was first seen the necessity for a vaginal examination did not become apparent. Undoubtedly had one been made, tenderness in the pelvis would have led to earlier operation. It is also difficult to believe that, in view of the amount of blood that was subsequently found in the abdomen, the initial pain in the lower abdomen, so severe as to cause perspiration, was not accompanied by tenderness and spasm. There is no medical excuse for this mistaken diagnosis and subsequent fatality.

DEATH

DOUGHERTY — HARRY L. DOUGHERTY, M.D., of Boston, died June 1. He was in his forty-third year.

Dr. Dougherty received his degree from the University of Louisville School of Medicine in 1925. He was a member of the Massachusetts Medical Society and the American Medical Association.

He is survived by his widow, his parents, two daughters, two sons, four sisters and three brothers.

MISCELLANY

SEROLOGIC TESTS FOR THE DIAGNOSIS OF SYPHILIS AND GONORRHEA

The Health Department of the City of Boston has announced that, effective June 1, the routine serologic test at the Bacteriological Laboratory for the diagnosis of syphilis will be the Hinton flocculation test. Temporarily, on request, parallel spinal-fluid and blood Wassermann tests will also be carried out. The Kahn test will be performed only when requested.

NOTE

At a meeting in Richmond, Virginia, on May 5, the American Branch of the International League against Epilepsy elected Dr. H. Houston Merritt, of Boston, president, and Dr. Frederic A. Gibbs, of Boston, secretary-treasurer, for the ensuing year.

CORRESPONDENCE

QUALIFICATIONS FOR HOSPITAL-STAFF MEMBERSHIP

To the Editor: My attention has been called to several instances in which members in good standing in our society have been refused courtesy privileges in certain hospitals. In each case the physician concerned was a graduate of a school other than Class A, according to the usual standard of classification.

The reason invariably set down for the refusal to grant such privileges is that the American College of Surgeons will not certify hospitals if graduates of such schools are admitted to their staffs.

There is within this state an ever-increasing group of these graduates who have been found qualified by the Massachusetts Board of Registration in Medicine, who have been considered capable and conscientious by the boards of censors of the Massachusetts Medical Society and who practice good medicine. This denial of hospital privileges has in specific instances not only made the paths of practice difficult for these doctors, but has brought about actual hardship, and does not seem just to me.

I am quite aware of our lack of jurisdiction over the action of the staffs of hospitals. Nevertheless I do question the wisdom of tacitly permitting practices which may at some time be held to be discriminatory, hence damaging, to exist within our membership.

When it is considered that such action as is taken is in compliance with the rule of the American College of Surgeons and that the burden is placed upon the hospital, I sometimes wonder just what the advantages of hospital membership in the college are. All this quite naturally raises the questions from whom the American College of Surgeons derives its authority and whether or not the pursuance of policies which might one day be held to be discriminatory upon the part of our membership is ethical under the standards set up by our society.

FRANK CRUICKSHANK, M.D.

1247 Beacon Street
Brookline, Massachusetts

NOTICES

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

A program in public-health engineering, covering military and public-health practice, will be given at the Department of Biology and Public Health, Massachusetts Institute of Technology from June 16 to July 25; the program will emphasize the application of facilities in public-health engineering to industrial and military problems of the national defense preparation. Basic training in chemistry and biology is required for this program, which is intended primarily for graduate engineers, sanitary chemists and biologists, bacteriologists, officers in the United States military service and others engaged in public-health engineering work.

EVANS AUDITORIUM

The third of a series of lectures by Dr. Albert B. Ferguson on "Roentgenology of the Bones and Joints" will be delivered at Evans Auditorium, 78 East Concord Street, Boston, on Monday, June 9, at 7:30 p.m.

The medical profession is invited.

AMERICAN COLLEGE OF PHYSICIANS

The twenty-sixth annual session of the American College of Physicians will be held in St. Paul, Minnesota, on April 20-24, 1942. Dr. Roger I. Lee, of Boston, president of the American College of Physicians, will have charge of the program of the general sessions and lectures. Dr. John A. Lepak, of St. Paul, has been appointed general chairman; he will be in charge of the program of hospital clinics and round-table discussions.

as well as local arrangements. Mr Edward R Loveland, executive secretary of the college, 4200 Pine Street Philadelphia, will have charge of the general management of the session and of the technical exhibits.

AMERICAN CONGRESS OF PHYSICAL THERAPY

The twentieth annual scientific and clinical session of the American Congress of Physical Therapy will be held September 1-5, at The Mayflower, Washington, D C. Mornings will be devoted to the annual instruction course, and afternoons and evenings to scientific sessions. The seminar and convention proper will be open to physicians and qualified technicians.

For information concerning the seminar and preliminary program of the convention proper, address American Congress of Physical Therapy, 30 North Michigan Avenue, Chicago.

At the same time, the twenty fifth annual meeting of the American Occupational Therapy Association will be held at The Mayflower. A combined meeting will be held on Wednesday, September 3. For information concerning the American Occupational Therapy Association, address Mrs Meta R Cobb, 175 Fifth Avenue New York City.

UNITED STATES CIVIL SERVICE EXAMINATIONS

Public Health Nursing Consultant, \$2600 to \$3000 a Year
Medical Technician, \$1620 to \$2000 a Year
Junior Laboratory Helper, \$1440 a Year

The United States Civil Service Commission has announced open competitive examinations to fill the positions of public health nursing consultant, medical technician and junior laboratory helper in the United States Public Health Service of the Federal Security Agency. Full information regarding the qualifications required and the applications for these examinations may be obtained from the Secretary, Board of United States Civil Service Examiners, at any first class or second class post office, or from the United States Civil Service Commission Washington, D C.

EXAMINATIONS FOR APPOINTMENTS IN THE MEDICAL CORPS OF THE UNITED STATES NAVY

The next examination for appointments as assistant surgeon (lieutenant, junior grade), United States Navy Medical Corps, will be held at all major Medical Department activities on August 11 to 15, inclusive. Applications for this examination must be received at the Bureau of Medicine and Surgery, Navy Department, Washington D C not later than July 15.

Applicants for appointment as assistant surgeon must be citizens of the United States, more than twenty one but less than thirty two years of age at the time of acceptance of appointment, and graduates of a Class A medical school who have completed at least one year of intern training in a hospital accredited for intern training by the Council on Medical Education and Hospitals of the American Medical Association.

A circular of information listing physical and other requirements for appointment subjects in which applicants are examined, application forms and other data pertaining to salary allowances and so forth may be obtained from the Bureau of Medicine and Surgery on request.

An examination for appointment as acting assistant surgeon for intern training in naval hospitals accredited for intern training by the Council on Medical Education and Hospitals of the American Medical Association will be held at all major Medical Department activities on June 23 to 26, inclusive. Students in Class A medical schools who will complete their medical education this year are eligible to apply for these appointments, and if successful will receive their appointments approximately one month after the date of the examinations. Students in Class A medical schools who will have completed their third year of medical education this year are eligible to take this examination, and if successful will receive their appointments on or about July 1, 1942 after they have completed their medical education.

Applicants for appointment as acting assistant surgeon for intern training must be citizens of the United States, more than twenty one but less than thirty two years of age at the time of acceptance of appointment. Acting assistant surgeons are appointed for a period of eighteen months. After the appointee has served as an intern in a naval hospital for twelve months, he is eligible for and may take the examination for appointment as assistant surgeon.

A circular of information listing physical and other requirements for appointment as acting assistant surgeon subjects in which applicants are examined, application forms and so forth may also be obtained from the Bureau of Medicine and Surgery on request.

Assistant surgeons and acting assistant surgeons for intern training are appointed in the rank of lieutenant (junior grade), United States Navy Medical Corps. The pay and allowances for an officer of this rank total \$2699 per year if he has no dependents, and \$3158 per year if he is married or has dependents.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, JUNE 8

MONDAY JUNE 9
12:15-1:15 p.m. Clin copathological conference Peter Bent Brigham Hospital amph theater

*7:30 p.m. Roentgenology of the Bones and Joints Dr Albert B Ferguson Evans Auditorium 78 East Concord Street Boston

TUESDAY JUNE 10
1:15-1:45 p.m. Clin corneotomology conference Peter Bent Brigham Hospital amph theater

WEDNESDAY JUNE 11
*12 m Clin copathological conference Children's Hospital

*Open to the medical profession

JUNE 8-9 - American Psychopathological Association Hotel Traymore Atlantic City New Jersey

JUNE 16-JULY 25 - Massachusetts Institute of Technology Page 996
JUNE 22-24 - Maine Medical Association Marshall House York Harbor Maine

SEPTEMBER 1-5 - American Congress of Physical Therapy See above
SEPTEMBER 1-5 - American Occupational Therapy Association The Mayflower Washington D C

OCTOBER 13-24 - 1941 Graduate Program of the New York Academy of Medicine Page 834 issue of May 8

OCTOBER 14-17 - American Public Health Association Page 59 issue of March 2

APRIL 20-24 1942 - American College of Physicians Page 997

DISTRICT MEDICAL SOCIETY

NORFOLK SOUTH

JUNE 11 - Page 961 issue of May 79

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

Roentgen Interpretation. By George W. Holmes, M.D., roentgenologist, Massachusetts General Hospital, and clinical professor of roentgenology, Harvard Medical School; and Howard E. Ruggles, M.D. Sixth edition, thoroughly revised. 8°, cloth, 364 pp., with 246 illustrations. Philadelphia: Lea and Febiger, 1941. \$5.00.

Lectures on Diseases of Children. By Sir Robert Hutchison, Bart., M.D., LL.D., F.R.C.P., consulting physician, London Hospital and Hospital for Sick Children, Great Ormond Street; and Alan Moncrief, M.D., F.R.C.P., physician to the Children's Department, Middlesex Hospital, and to outpatients, Hospital for Sick Children, and pediatrician, Queen Charlotte's Maternity Hospital. Eighth edition. 8°, cloth, 471 pp., with 107 illustrations. Baltimore: Williams and Wilkins Company, 1940. \$6.75.

Introduction to Physical Biochemistry. By J. M. Johlin, Ph.D., D.Sc., associate professor of biochemistry, Vanderbilt University School of Medicine. 8°, cloth, 231 pp., with 10 illustrations. New York: Paul B. Hoeber, Incorporated, 1941. \$2.75.

Health in Iceland. By Vilmundur Jónsson, director of public health, Iceland. A reprint from *The Report on Public Health in Iceland, 1938*. 8°, paper, 29 pp., with 3 charts and 1 map. Reykjavík: Ríkisprentsmidjan, 1941.

Physical Medicine: The employment of physical agents for diagnosis and therapy. By Frank H. Krusen, M.D., associate professor of physical medicine, Mayo Foundation, University of Minnesota, and head of Section on Physical Therapy, Mayo Clinic. 8°, cloth, 846 pp., with 351 illustrations. Philadelphia: W. B. Saunders Company, 1941. \$10.00.

A Short History of Psychiatric Achievement, with a Forecast for the Future. By Nolan D. C. Lewis, M.D., professor of psychiatry, College of Physicians and Surgeons, Columbia University, and director, New York State Psychiatric Institute and Hospital. 8°, cloth, 276 pp. New York: W. W. Norton and Company, Incorporated, 1941. \$3.00.

Handbook of Anaesthetics. (Formerly by Ross and Fairlie.) Revised by R. J. Minnitt, M.D. (Liverpool), D.A. (D.C.P. and S. Eng.), lecturer in anesthesia, University of Liverpool, director of anesthetics, David Lewis Northern Hospital, Liverpool, and honorary anesthetist, Liverpool Royal Infirmary and Liverpool Maternity Hospital. With chapters on local and spinal anesthesia by W. Quarry Wood, M.D., Ch.M., F.R.C.S.E., surgeon, Edinburgh Royal Infirmary. Fifth edition. 12°, cloth, 364 pp., with 103 illustrations. Baltimore: Williams and Wilkins Company, 1940. \$4.00.

Hutchison's Food and the Principles of Dietetics. Revised by V. H. Mottram, M.A. (Cant.), professor of physiology, King's College of Household and Social Science, University of London; and George Graham, M.D. (Cant.), F.R.C.P. (Lond.), physician to St. Bartholomew's Hospital. Ninth edition. 8°, cloth, 648 pp., with 30 illustrations. Baltimore: Williams and Wilkins Company, 1940. \$6.75.

BOOK REVIEWS

Surgery of Modern Warfare. Vol. 1. By sixty-five contributors. Edited by Hamilton Bailey, F.R.C.S. 4°, cloth, 480 pp., with 502 illustrations. Baltimore: Williams and Wilkins Company, 1941. \$10.00.

This is a very timely book, and will find great usefulness in training the medical personnel of our army and navy in the methods of traumatic surgery. It is written by sixty-five specialists who have had first-hand experience with the casualties of the war in England. The first part of the book is devoted to general subjects such as burns, septic wounds, prevention of tetanus and skin grafting; the second half deals with wounds in the various organs and regions of the body. The difficult problems of traumatic neurosurgery are not considered but are to be the subject of a second volume.

If a generalization on such a detailed work as this is permitted, one would say that the great advances in the present war are the routine débridement of fresh wounds, and the use of closed plaster in the treatment of compound fractures that are accompanied by widespread destruction of soft tissue. The principle that the body will handle infection in very large wounds, if allowed to do so by immobilization and closed dressing, is associated in this country with the name of Winnett Orr and in Europe with Trueta. The substantiation of this work by such a critical writer as Bailey makes it obligatory that it should be adopted in this country by all those who are called on to do war surgery.

The certainty of active immunization for tetanus is not upheld by these authors as a proved fact. They use prophylactic antitoxin whether or not a patient has had toxoid previously. This contradicts American opinion, which considers active immunity to tetanus as a very reliable procedure. The authors record a definite clinical impression about the value of x-ray in the treatment of gas gangrene. No figures are given to prove this conviction, but the impression is so favorable as to warrant its use routinely.

The book has dozens of good illustrations, some of them done in color. This would be a monumental effort during peacetime. That it was produced by busy and harassed surgeons on war duty is a great compliment to their endurance and devotion to science.

An Introduction to Dermatology. By Norman Walker, Kt., M.D., LL.D., consulting physician; and G. H. Percival, M.D., Ph.D., physician for diseases of the skin, Royal Infirmary, Edinburgh. Tenth edition. 8°, cloth, 391 pp., with 102 plates and 96 illustrations. Baltimore: Williams and Wilkins Company, 1939. \$7.00.

This small book on dermatology has numerous interesting features. The senior author, a British dermatologist of wide experience, always writes in a very personal way and delves into his past contacts with patients for many apt cases and therapeutic results. He explains the derivations of many disease names, and other such bits of information are of interest to the reader. The descriptions of disease manifestations are not so profuse as those in many textbooks, but the excellent color plates provide the student with a lifelike appearance of many skin diseases. Many types of dermatitis are quite thoroughly discussed. Therapeutic measures are based on many years' experience in clinics and private practice, and often form an interesting contrast with the usual methods in this country. Syphilis is very inadequately handled.

The New England Journal of Medicine

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VOLUME 224

JUNE 12, 1941

NUMBER 24

EQUINE ENCEPHALOMYELITIS IN MASSACHUSETTS*

An Analysis of the 1938 Outbreak, a Follow-Up of Cases and a Report of a Mosquito Survey

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INFECTION of man with the Eastern variety of equine encephalomyelitis was first demonstrated by Fothergill, Dingle, Farber and Connolly¹ and by Webster and Wright.² These workers isolated the virus from the brains of children who had died of a previously unrecognized type of encephalitis during an outbreak of equine encephalomyelitis in the horses of southeastern Massachusetts. Reviews of equine-encephalomyelitis infections in horses and men and the history of this disease have been made by Gordon³ and Fothergill.⁴ A description of the Massachusetts outbreak of equine encephalomyelitis, with an analysis of the cases in man, was reported by Feemster⁵ in 1938. It is the purpose of this paper to add further detail to Feemster's report, to follow up the surviving patients, and to make a report on the Massachusetts Mosquito Survey, which was organized to ascertain the distribution of mosquitoes that have been demonstrated to transmit experimentally the Eastern type of equine encephalomyelitis to laboratory animals.

THE MASSACHUSETTS OUTBREAK

In July, 1938, for the first time, equine encephalomyelitis was recognized in horses in southeastern Massachusetts; and in the course of about ten weeks 269 deaths were reported. The geographical distribution of deaths in horses is given in Figure 1. The disease made its first appearance in the upper basin of the Taunton River, which drains through nearby Rhode Island, and spread to contiguous areas, particularly toward the northeast. There were relatively few cases to the south and southeast, and none occurred on Cape Cod or the nearby islands. About 70 per cent of the Massachusetts cases occurred in a thirty mile

square, extending from the mouth of the Taunton River in the south to Boston on the north, and from the boundary of Rhode Island, eastward to the coast of Massachusetts. Isolated cases occurred as far north as Maine and as far west as Worcester. Rhode Island to the west reported 55 cases among horses, and Connecticut 29.

During the summer and early autumn, rainfall in southeastern Massachusetts and Rhode Island was unusually heavy, and as a result mosquitoes were very prevalent in these areas. The prevailing winds in this region are from the southwest, and the tendency of the outbreak to spread in a northeasterly direction may be partly explained by the supposition that infection-bearing mosquitoes were carried by these prevailing winds. Two other factors, the movement of infected horses and the flights of infected birds, probably played an important role in the spread of the outbreak. Horses that were apparently well were moved from one country farm to another, on one such occasion a horse was moved thirty miles northeast to a town near the coast. Although apparently well when moved, the horse developed symptoms on the following day, and the diagnosis of equine encephalomyelitis was proved by the isolation of the virus from the brain. During the outbreak, Fothergill and Dingle⁶ isolated the Eastern type of virus from the brains of a pigeon that had died in the same area, southeastern Massachusetts, and Tyzzer, Sellards and Bennett⁷ isolated the same virus from the brains of ring-necked pheasants from Connecticut. These findings suggested that birds may be reservoirs of the disease and factors in its spread.

Almost simultaneously, in the same area, a new type of human encephalitis appeared, largely limited to children. The geographical distribution of the cases is shown in Figure 2. This outbreak was the first known infection of man with the

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Eastern variety of equine encephalomyelitis virus. The prevalence of the cases among horses and human beings is given in Figure 3. The median date of reported deaths among horses occurred during the week ending August 27, or two weeks in advance of the median date of onset for cases in human beings. Apparently, the peak of the

equine encephalomyelitis. From 9 of the patients Fothergill¹ and Webster and Wright² isolated the Eastern virus. These workers established the diagnosis of equine encephalomyelitis in 10 other cases by finding neutralizing antibodies for the same virus in the blood of the patients.

Eight other cases were diagnosed on the basis

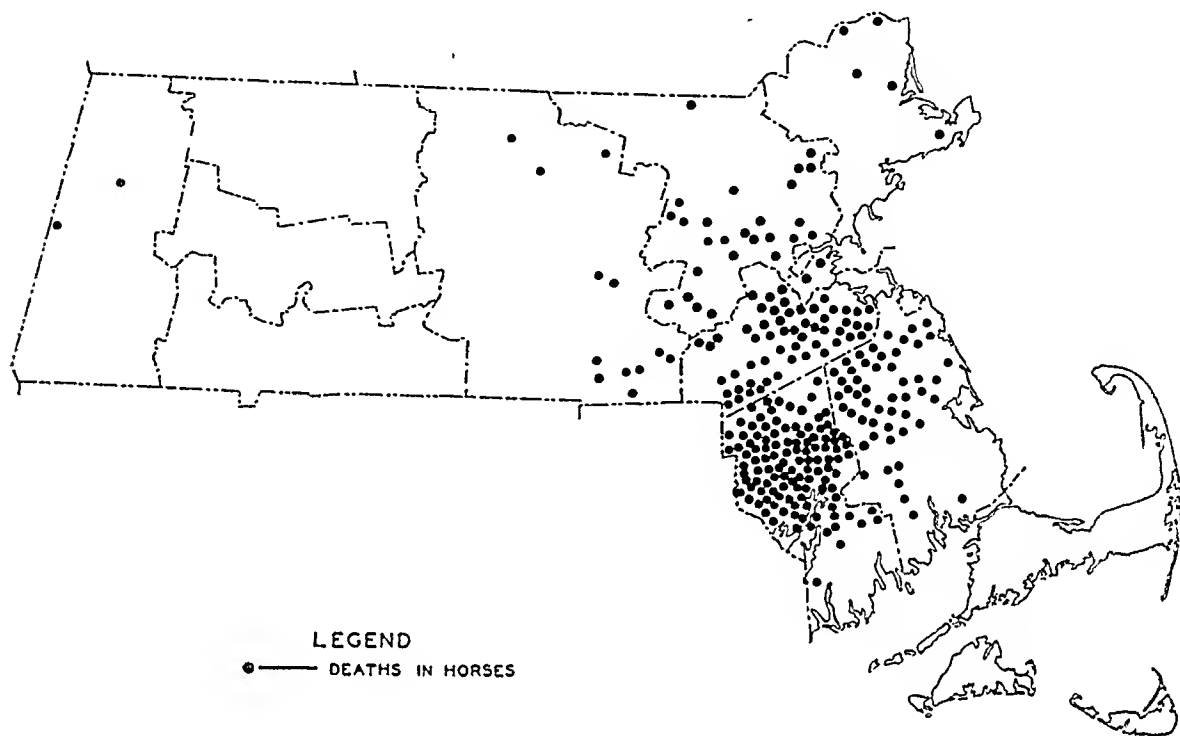


FIGURE 1. *Distribution of Equine Encephalomyelitis in Horses in Massachusetts, 1938.*

The deaths were most numerous in Bristol, Plymouth and Norfolk counties, the three counties between Boston on the north and Buzzards Bay on the south.

outbreak among horses preceded that of the outbreak among human beings by an interval of over two weeks. Although the prevalence of the disease was much greater among horses than among human beings, the rise and fall of the outbreak in these groups was similar. The epizootic began slowly without increase for four weeks, and then rapidly reached its peak in two weeks. Remaining at this peak level for about a week, the outbreak subsided more slowly than it had begun. The last case was reported late in October, sixteen weeks after the beginning of the outbreak.

There were no multiple cases among families, and multiple cases on the same farm or in the same stable were rare among horses. These field observations confirmed experimental evidence that the disease is not transmitted by contact between laboratory animals.

ANALYSIS OF CASES IN MAN

In all, the Massachusetts Department of Public Health investigated 44 cases suspected of being

of pathognomonic brain lesions at autopsy. These autopsies were performed by Wesselhoef, Smith and Branch,⁸ Farber et al.⁹ and Alexander.¹⁰ A diagnosis of equine encephalomyelitis was considered justified in 7 additional patients because of the characteristic clinical findings. These cases were fatal and were not autopsied; blood specimens for neutralization tests were not obtained. Ten other cases were suspected of being due to the Eastern virus, but investigation revealed that a diagnosis of equine encephalomyelitis was unwarranted. In all, there were 34 patients in whom the diagnosis of infection with the Eastern virus seemed justified.

In analyzing these 34 cases, 2 groups were considered.

Proved cases. This group included the 9 cases in which the virus was isolated and the 10 in which the presence of neutralizing antibodies was proved. The finding of neutralizing antibodies has been considered proof of infection with the Eastern variety virus because these persons presented the same acute disease and the same clinical find-

ings as those from whom the virus was isolated. Moreover, Fothergill⁴ has been unable to find neutralizing antibodies in the blood of family contacts of proved cases, human or equine.

The age distribution of the proved and typical cases is given in Table 1. One quarter of these patients were less than one year of age, 70 per cent were under ten years of age, and only 15

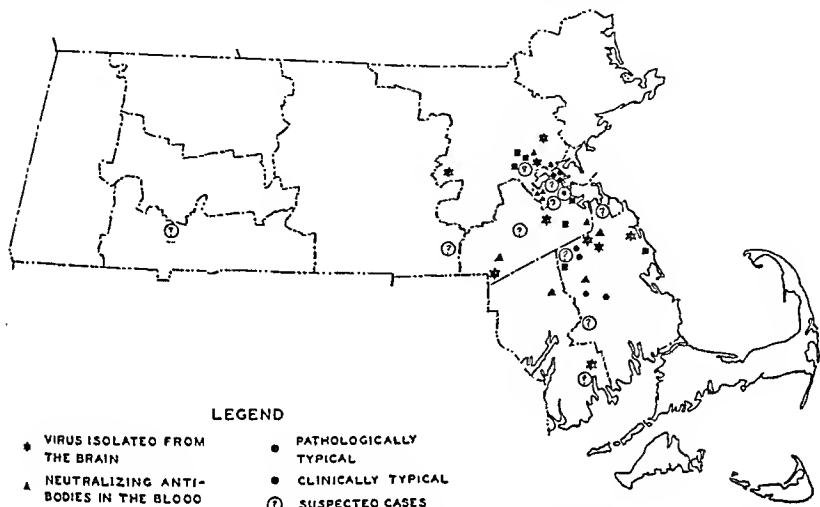


FIGURE 2. Distribution of Equine Encephalomyelitis in Man in Massachusetts, 1938.

In general, the distribution of human and horse infections corresponds. The apparent greater density of infections in Metropolitan Boston is due to the greater density of population.

Typical cases. The 8 cases in which the diagnoses were based on pathognomonic brain lesions, and the 7 in which there were characteristic clinical

per cent were over twenty-one years of age. The sex distribution was the same in both groups: 17 patients were males, and 17 were females.

The fatality rate among the 34 patients was 74 per cent. This compares with a fatality rate of

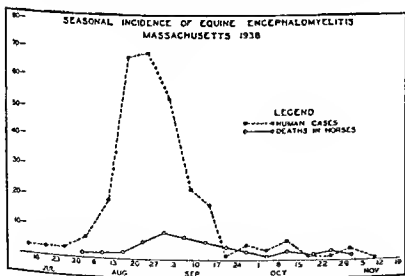


FIGURE 3. Seasonal Incidence of Equine Encephalomyelitis in Massachusetts, 1938.

The outbreak among horses was greater than that among human beings; the peak of the former preceded the peak of the latter by about two weeks.

findings comprise this group of patients. Since the diagnosis was less convincing, they are not included with the proved infections.

TABLE 1. Age Distribution.

AGE	PROVED CASES	TYPICAL CASES	TOTAL CASES	PERCENTAGE OF TOTAL
Under 1 yr.	6	3	9	26
1-4 yr.	6	4	10	29
5-9 yr.	5	0	5	15
10-19 yr.	1	4	5	15
20-49 yr.	0	1	1	3
50 yr. and over	1	3	4	12
Totals	19	15	34	

90 per cent among horses in Massachusetts, 94 per cent in Rhode Island and 93 per cent in Connecticut.

Wesselhoeft, Smith and Branch⁸ have reported the cases that were hospitalized at the Haynes Memorial in Boston. McAdams and Porter¹¹ described a case in Fall River, and Farber et al.⁹ analyzed the cases from the Children's Hospital in Boston. The following description of the

clinical course of this disease, as observed in Massachusetts, is based on observations of the patients and on analysis of the records of all the patients.

The disease was sudden in onset, especially in children. Following a period of prodromes associated with a fever of 100 to 102°F., nausea and vomiting, and headache in older patients, there was a period of well-being, lasting from twenty-four to thirty-six hours. During this time the temperature often dropped, symptoms disappeared, and in one case a child was well enough to go to see a motion picture. As a rule, patients did not come under medical observation until the disease was well advanced, and this period of prodromes was consequently observed in only a few cases. The acute manifestations of the disease are summarized in Figure 4. The symptoms are listed in

were frequent and often indicated the onset of convulsions. Edema, observed in infants and small children, was not pitting, and involved the extremities and face.

The duration of the disease varied from less than one day in fulminating attacks to over three weeks in the less severe forms. Table 2 gives the duration of the disease. The median length of

TABLE 2. Duration of Acute Illness.

DURATION	No. of Patients		
	LIVED	DIED	TOTAL
Less than 1 day	0	2	2
1-2 days	0	2	2
3-4 days	0	9	9
5-6 days	0	4	4
7-10 days	0	4	4
11-20 days	3	0	3
Over 21 days	6	4	10
Totals	9	25	34

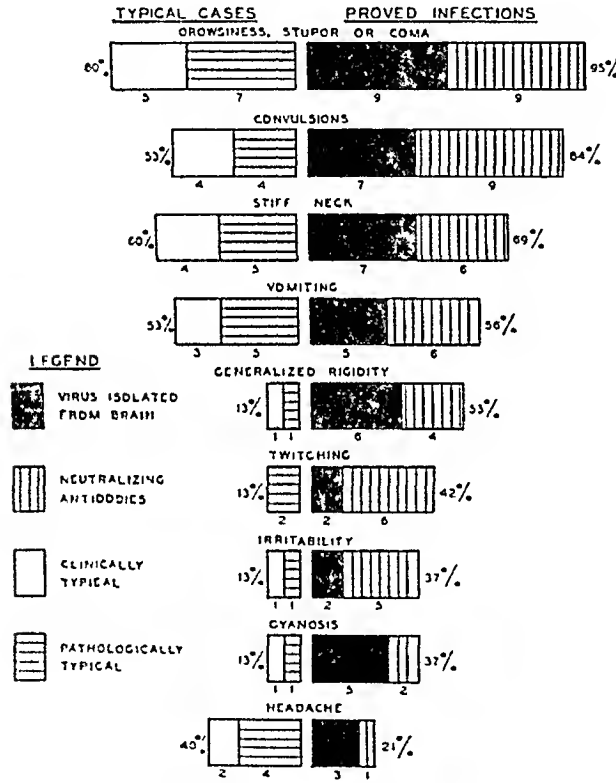


FIGURE 4. Clinical Findings in Infections of Man with Eastern Virus of Equine Encephalomyelitis. The number at the end of each column indicates the percentage of patients having the symptom. The numbers under each column indicate the number of patients presenting the finding.

the order of frequency with which they were observed: high fever ranging from 103 to 106°F., drowsiness progressing to stupor and coma, convulsions, either clonic or tonic, a stiff neck, often developing into generalized rigidity or opisthotonos, nausea and vomiting, cyanosis, irritability in infants and headache in older patients. Twitchings

duration was seven days for all the cases, over twenty days in the patients who survived, and four days in those who died. Of 10 patients who lived after the tenth day of illness, 4, or 40 per cent, died. The 4 patients who succumbed after twenty-one days of illness died either of exhaustion or of intercurrent infection.

A diagnosis of equine encephalomyelitis cannot be made on clinical findings alone. Laboratory data furnish confirmatory evidence. There is a leukocytosis of 14,000 to 66,000, with a differential count of 75 to 90 per cent neutrophils and 25 to 10 per cent lymphocytes. The spinal fluid is under increased pressure, and there is a pleocytosis during the acute phase, the counts averaging 500 to 1000 cells, chiefly neutrophils, per cubic millimeter. With the subsidence of the acute phase, the spinal-fluid cell count drops, and the lymphocyte becomes the predominating cell. Spinal-fluid sugar and chlorides are at a normal level, but the total protein is increased, especially in the convalescent stage.

Although blood cultures for the virus were not obtained during the epidemic, it is likely that if they are made early, using defibrinated blood, positive cultures may be obtained. Ten Broeck, Hurst and Traub¹² have isolated the virus from the experimental disease in horses, and Howitt¹³ has reported the isolation of the Western variety from the blood of a patient. According to Fothergill's⁴ findings, neutralizing antibodies may appear as early as the first week of the disease but are not likely to do so until the second week. Complete pathological descriptions have been written by Farber and Branch.¹⁴

There is no specific therapy for equine encephalomyelitis. Treatment is symptomatic and supportive. Isolation of the patient is not necessary, since the disease is not transmitted by direct contact. Chick vaccines, effective in the immunization of horses, have not yet been developed for use in man. Moreover, they are of no value in the treatment of horses.

FOLLOW UP OF CASES

All 9 surviving patients in whose blood neutralizing antibodies to the Eastern variety of virus were found were seen at varying intervals from the date of the original illness. In all cases except one, this follow up was made approximately a year after onset. These cases have been under the care of various physicians and clinics, and this analysis is made with the permission of each. Table 3

TABLE 3 Summary of Follow Up

CASE	SEX	AGE AT ONSET	INTERVAL TO LAST OBSERVATION	RESIDUAL SYMPTOMS
D A	M	12 mo	13 mo	Mental retardation on right leg paresis
M B	F	6 yr	15 mo	None
P C	M	12 mo	14 mo	Mental deficiency aphasia and left hemiparesis
L F	M	8 yr	15 mo	Definite mental retardation (age about 3 yr) and partial aphasia
D L	F	4 mo	13 mo	Mental retardation on right arm and frequent convulsions
M C	F	18 mo	13 mo	Mental deficiency marked lack of emotional control right leg paresis, paraparesis on right and partial deafness patient speaks only a few words
C D	M	6 yr	15 mo	None
T O C	M	4 mo	3 mo	None
R R	F	1 mo	11 mo	Decerebrate anmal and mass reflexes eyes do not react to light

summarizes the observations in the surviving patients. All but 3 developed disabling sequelae. Six showed evidence of cerebral degeneration, with definite mental retardation. Three patients continued to suffer from a hemiparesis, 3 from complete or partial aphasia, and 1 from emotional instability.

At this early date it is impossible to prognosticate the eventual course of these sequelae. However, it seems not unlikely that they are permanent and may even be progressive. In encephalitis lethargica, sequelae have appeared as late as five or more years after the original illness, and it is therefore important to follow these patients for at least five years.

MOSQUITO SURVEY

As soon as the true nature of the equine encephalomyelitis outbreak was realized, the Massachusetts

Department of Public Health, with the assistance of the United States Public Health Service, undertook the organization of a mosquito survey. During August and September, 1938, mosquitoes were unusually prevalent. On September 21, a severe hurricane swept over New England and many mosquitoes were destroyed. Identification of specimens collected in October revealed *Culex* and *Anopheles* mosquitoes. *Aedes* were no longer active, and relatively few were collected.

The study of the history of equine encephalomyelitis reveals that the disease often recurs in the same region in succeeding years. Therefore, during the early months of 1939 the Massachusetts Department of Public Health, under the direction of the commissioner, Dr. Paul J. Jakmauh, began to make plans for a state-wide mosquito survey. The aims were to ascertain whether mosquitoes are the natural vectors of the disease, to find naturally infected mosquitoes and to ascertain the distribution of experimentally demonstrated vectors, so that when and if the disease recurred, control measures might be effectively and efficiently instituted.

The active work of the survey was made on a state-wide basis during the months of July, August, September and October. It was carried out in co-operation with the Work Projects Administration, which supplied a personnel of 150. This personnel was under the technical direction of a member of the Department of Public Health and ten entomologists, who were employed during the course of the survey. Almost 50,000 separate collections of mosquitoes comprising 278,000 specimens were made by the WPA personnel and volunteer collectors, who were obtained through the co-operation of the local boards of health. Various state and federal institutions, schools, summer camps and many other agencies made numerous collections of mosquitoes. It is the purpose of this paper to make a report on this mosquito survey so far as it is concerned with equine encephalomyelitis.

In all, 56 different species of mosquitoes were collected in Massachusetts. Thirty-seven of these are biting and the remainder are nonbiting. Only 6 of the biting species have been shown by investigators to transmit experimentally the Eastern virus of equine encephalomyelitis to laboratory animals. Positive experimental transmission has been carried out with the following Massachusetts mosquitoes by Davis¹⁵: *Aedes cantator*, *A. sollicitans*, *A. texans*, *A. atropalpus* and *A. triseriatus*. *A. taeniorhynchus* was not collected in numbers large enough to conduct transmission experiments, however, Ten Broeck and Merrill¹⁶ have demonstrated

that it is a laboratory vector of the Eastern variety of virus. *Culex*, *Anopheles*, *Mansonia*, *Uranotaenia*, *Wyeomyia* and other genera of mosquitoes have thus far been unable to transmit the disease to laboratory animals in experiments conducted by Davis and other investigators.

Data, collected by the survey, have furnished additional epidemiological support to the mosquito-transmission theory of equine encephalomyelitis.

Seasonal prevalence of vector and disease. For the effective transmission of a mosquito-borne disease, there must be a certain minimal numerical

quitoes in 1938 provided optimal conditions for the outbreak.

Geographical distribution. The vectors of equine encephalomyelitis were present in those areas where, formerly, the disease was present. Only two vectors, *A. vexans* and *A. triseriatus*, were present in all places where cases occurred. *A. triseriatus*, however, was found to be only one fifth to one fifteenth as numerous as *A. vexans*. Therefore, statistically, it seems that *A. vexans* is the most important vector of equine encephalomyelitis.

The geographical distribution of the vectors of

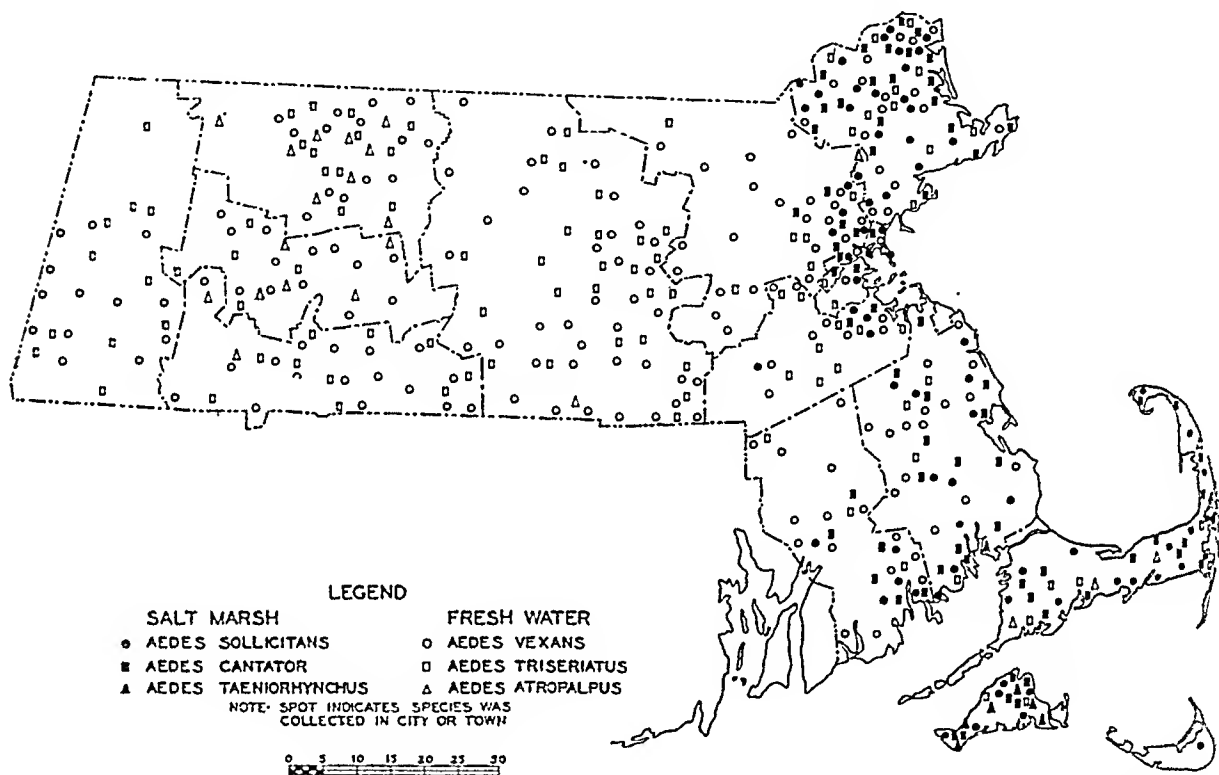


FIGURE 5. Distribution of Vectors of Equine Encephalomyelitis (Eastern Variety) in Massachusetts, 1939.

Aedes vexans was 5 to 15 times as numerous as *A. triseriatus*. The salt-marsh species were limited to an area fifteen miles from the nearest breeding place.

relation between the vector, host and susceptibles. When the vectors are unusually prevalent, conditions for increased transmission are present. In 1938, the outbreak reached a peak in late August and early September. In 1939, the seasonal prevalence of mosquitoes was determined. Whereas the genus *Aedes* was more abundant in spring and early summer, the vectors, *A. atropalpus*, *A. cantator*, *A. sollicitans*, *A. taeniorhynchus*, *A. triseriatus* and *A. vexans*, were most numerous in August and September. The seasonal prevalence of the suspected vector corresponds to that of the disease. Therefore, conditions most conducive to the transmission of the virus exist in the late summer and early autumn. The unusual abundance of mos-

equine encephalomyelitis is shown in Figure 5. *A. vexans* and *A. triseriatus* are state-wide in distribution. *A. sollicitans* and *A. cantator* are both salt-marsh mosquitoes, which are usually limited to within ten miles of the salt water, but which in exceptional circumstances may be found fifteen miles inland. *A. atropalpus* breeds in clear water that has accumulated in eroded rock formations, as in the Connecticut Valley, Essex County and Cape Cod. *A. taeniorhynchus*, which Ten Broeck and Merrill¹⁰ have shown to be able to transmit the Eastern variety virus experimentally to laboratory animals, has been collected only along the southern coast of Massachusetts — on the island of Martha's Vineyard and adjacent Cape Cod.

The most probable natural vector. Further confirmatory evidence that *A. vexans* is the principal vector is found in the distribution of equine-encephalomyelitis cases in 1939. Twelve cases in horses were diagnosed by the Massachusetts Department of Agriculture. Although most of these were diagnosed on clinical findings, the virus was isolated from the brains of two horses that had lived and died in the towns of New Braintree and Westborough. These towns are so far inland that no salt-marsh mosquitoes were collected, and the probability that a mosquito of this group infected these horses is negligible. The nearest breeding place of the salt-marsh vector was twenty miles from Westborough and over fifty miles from New Braintree. Fifteen miles away from their breeding places is the greatest distance at which the adult salt-marsh mosquitoes, *A. sollicitans* and *A. cantator*, were collected. When wind-borne, both species have been recorded to fly farther. However, the prevailing winds in the summer and early autumn blow from the west and southwest, hence the salt-marsh mosquitoes would have to fly against the wind for twenty to fifty miles to reach these two towns. Furthermore, long flights of salt-marsh mosquitoes are a rare phenomenon; statistically, therefore, the chances that a few adults may survive such long flights are almost negligible. All these facts point to a mosquito other than a salt-marsh *Aedes* as the carrier. Only two vectors were found in this area, *A. triseriatus* and *A. vexans*. Since *A. vexans* is five to fifteen times as numerous as the former, statistically, *A. vexans* is the most probable vector responsible for the infection of these horses.

Age distribution of cases according to the bionomics of vectors. The determination of the bionomics of the vectors of equine encephalomyelitis offers explanations of several phenomena observed in the 1938 outbreak. Twenty-six per cent of the cases in human beings were in infants under one year of age, and 70 per cent of the patients were children under ten. Although detailed information about individual cases has not been obtained, the high incidence among the young age groups may be explained by the following observations. During the summer, infants are often left to sleep outdoors, sometimes without protective netting, and are unable to defend themselves against mosquitoes. Moreover, children under ten who play outdoors the greater part of the day are less efficient than older groups in protecting themselves, since they do not react to a mosquito until it has bitten them. Thus infants and children who sleep or play outdoors are more apt to be bitten than older persons who, taught by experience, react to the buzzing or alighting of a mosquito.

Outdoor vectors. It was observed that horses which were kept outdoors formed the larger portion of the cases. Data collected during the survey indicate that the vectors are more likely to bite in the open than indoors. Hence, horses that are outdoors are more apt to be infected.

Of all mosquitoes captured on man outdoors, 60 per cent were vectors, whereas only 6 per cent of those caught indoors were carriers. Therefore, the chances that a mosquito is a vector are ten times as great if the biting occurs outdoors than if it occurs indoors. These findings suggest why infants and children comprise such a large number of the cases.

SUMMARY

Equine encephalomyelitis due to the Eastern variety virus infected 34 persons during an outbreak of this disease among horses in southeastern Massachusetts in 1938. Small infants and children under ten years of age constituted 70 per cent of the cases.

The onset of the disease is acute, the course rapid, and death occurs in less than ten days in the majority of cases.

Permanent sequelae occurred in 6 of the nine surviving patients. The sequelae, in the order of frequency, were mental retardation, hemiparesis, aphasia and emotional instability.

Three salt-marsh species—*Aedes cantator*, *A. sollicitans* and *A. taeniorhynchus*, and three fresh-water species, *A. atropalpus*, *A. triseriatus* and *A. vexans*, all vectors of equine encephalomyelitis—were collected by the survey in 1939. The former are usually limited to within ten miles of salt water. Two, the fresh-water vectors *A. triseriatus* and *A. vexans*, were state-wide, the latter being five to fifteen times as prevalent as the former.

A. vexans is probably the most important vector of equine encephalomyelitis in Massachusetts. Along the coast the *A. sollicitans* and *A. cantator* are about as numerous as *A. vexans* and may have been, in part, responsible for the outbreak of 1938 in the coastal region.

The epidemiologic and entomologic data collected by this survey support the laboratory evidence that equine encephalomyelitis is transmitted by mosquitoes, because the geographical distribution and the seasonal prevalence of the disease and the vectors have been found to be the same. The biting habits of the vectors of equine encephalomyelitis suggest that man and animal outdoors are exposed ten times as much to the chance of infection as those in buildings.

REFERENCES

1. Fothergill, L. D., Dingle, J. H., Farber, S. and Connerley, M. L. Human encephalitis caused by virus of Eastern variety of equine encephalomyelitis. *New Eng. J. Med.* 219:411, 1938.
2. Webster, L. T. and Wright, F. H. Recovery of Eastern equine encephalomyelitis virus from brain tissue of human cases of encephalitis in Massachusetts. *Science* 68:305, 1938.
3. G. J. J. J. E. Infection of man with virus of equine encephalomyelitis. *Am. J. M. Sc.* 198:437-444, 1939.
4. Fothergill, L. D. Equine encephalomyelitis. In *Virus and Rickettsial Diseases: A Symposium held at the Harvard School of Public Health, June 12-June 17, 1939*. 907 pp. Cambridge, Massachusetts: Harvard University Press, 1940. Pp. 661-683.
5. Feemster, P. F. Outbreak of encephalomyelitis in man due to the eastern virus of equine encephalomyelitis. *Am. J. Pub. Health* 28:1403-1410, 1938.
6. Fothergill, L. D. and Dingle, J. H. Fatal disease of pigeons caused by virus of Eastern variety of equine encephalomyelitis. *Science* 85:547, 1938.
7. Tyzzer, E. E., Sellards, A. W. and Bennett, B. L. Occurrence in nature of "equine encephalomyelitis" in ring-necked pheasant. *Science* 88:505, 1938.
8. Weisselhoeft, C., Smith, E. C. and Branch, C. P. Human encephalitis. *J. A. M. A.* 111:1735-1741, 1938.
9. Farber, S., Hill, A. M., Connerley, M. L. and Dingle, J. H. Encephalitis in infants and children. *J. A. M. A.* 114:1725-1731, 1940.
10. Alexander: personal communication.
11. McAdams, J. C. and Porter, J. E. Encephalitis in man caused by the virus of equine encephalomyelitis. *New Eng. J. Med.* 221:153-154, 1939.
12. Ten Broeck, C., Hurst, E. W. and Traub, E. Epidemiology of equine encephalomyelitis in eastern United States. *J. Exper. Med.* 62:77-85, 1935.
13. Howitt, B. Recovery of the virus of equine encephalomyelitis (western type) from human blood serum. *Science* 89:541, 1939.
14. Farber, S. and Branch, C. F.: unpublished data.
15. Davis, W. A. A study of birds and mosquitoes as hosts for the virus of eastern equine encephalomyelitis. *Am. J. Hyg.* 32 (Series C): 45-59, 1940.
16. Ten Broeck, C. and Merrill, M. H. Transmission of equine encephalomyelitis by mosquitoes. *Am. J. Path.* 11:847, 1935.

A FIERY ORDEAL*

JOHN FLEET, M.B.

BOSTON

I GRADUATED from Harvard College in 1785 and determined to become a doctor. I at once entered the new Medical School at the College in Cambridge, and for three years sat under those erudite young teachers, Dr. John Warren, Dr. Benjamin Waterhouse and Dr. Aaron Dexter. On May 23rd, 1788, shortly before I obtained my degree of Bachelor in Medicine at Commencement. I appeared before the Censors of the Massachusetts Medical Society in the County Court House in Boston, where meetings of the Society were held, hoping on their approval to obtain a license to practise the healing art in the Commonwealth.

The Board of Censors of the Society at the time was made up of Dr. James Lloyd, Dr. Joseph Gardner, Dr. Isaac Rand, and Dr. Samuel Danforth of Boston; and Dr. Oliver Prescott of Groton. Dr. Prescott, being hard of hearing, took no particular part in my examination; business prevented Dr. Danforth's attendance.

Dr. Lloyd was the senior member present. He ranked high in the profession in those days. He had taken the lead in regard to the practice of surgery in Boston and was the first who introduced hereabouts the male practice of the obstetric art as a general appendage to the attire of a physician. He was very successful in it and consequently was greatly esteemed among the ladies. He entertained a great deal of company, kept a genteel equipage and a suite of servants; his horses were esteemed equal to any in the town. In brief, he was a gentleman of the old stamp and deservedly respected and valued.

Dr. Joseph Gardner was employed both as a physician and surgeon as much as any other gentleman in the profession. He, too, was an older man, in practice for some years, and included among his pupils John Homans and Charles Jarvis. He pretended that he looked upon learning as superfluous; that the bedside was the only school for a physician. But he did study and was a more learned man than he chose to appear. When he wished he could be both witty and satirical.

Dr. Isaac Rand, the youngest Censor, was a pupil of Dr. Lloyd's. He acted as Secretary of the Board. He was interested in mathematics and was always seeking for something like scientific fact on which to lean in his profession. For want of knowledge he was continually dissatisfied and read more books than any physician in Boston. To be sure, he was apt to pin his faith in the last book he read; but he was a successful practitioner, had a discriminating judgment, and was remarkably neat in his operations.

These were the gentlemen who were to examine me. The examination was to be no easy task because Dr. Warren and his new school at Harvard were by no means popular with physicians of the Massachusetts Medical Society. Dr. Warren was regarded by many as an artful man who had got to the windward of his colleagues in establishing a medical school and himself a Professor. Dr. Waterhouse, in the Theory and Practice of Physic, was thought to have received his appointment in part, at least, because he was a relative and pupil of Dr. Fothergill of London; and it was common gossip that Dr. Fothergill intended to help in the development of a Medical Institution in New Eng-

*An unpublished manuscript. Submitted by Dr. Reginald Fitz.

land where his relative and student proposed to dwell, Dr. Dexter, a respectable figure, pretended to no greater knowledge of Chymistry and the Materia Medica than did several other members of the Society who also had academical leanings, so that the justification of his choice was queried. I knew, as first product of this new School to be examined by the Censors of the Massachusetts Medical Society, that I would be thoroughly sifted. And indeed I was.

Dr Rand began my examination by asking me to describe the process of deglutition and digestion.

I answered, "The food is first taken into the mouth, divided by the teeth, and pushed back wards by the muscles of the throat."

"Is there anything to prevent it from passing into the trachea?"

"The glottis." And then I added immediately, "The epiglottis, I mean, that covers the glottis."

"What is the epiglottis?"

"A cartilaginous substance."

"Proceed in the process," said Dr Rand.

"The food is pushed into the esophagus, passes down to the stomach, is then mixed with the gastric juice and operated upon by the stomach. If vegetable food be used, a fermentation takes place."

"What is the upper orifice of the stomach called?"

"Cardia."

"What the other?"

"Pylorus. The food is next protruded into the duodenum, and there it mixes with the pancreatic juice and bile."

"What conveys the bile into the duodenum?"

"The ductus communis choledochus."

"Does the hepatic duct enter the ductus communis choledochus?"

"Almost always," I answered.

"Proceed with the food," Dr Rand demanded.

"The food being mixed with the bile and pancreatic juice, of what use is the bile?"

I hesitated. He repeated the question.

"It assists to form chyle," I answered.

"Go on."

"When chyle gets into the small intestines it is absorbed by the lacteals."

"What are the lacteals?"

"Vessels that convey chyle to the receptaculum chyli."

Dr Gardner interrupted. "Where does it lie?" he asked.

"I do not exactly remember upon which vertebra of the loins," I replied.

Dr Rand resumed the questioning. "What does the chyle pass through in going to the receptaculum chyli?" said he.

"Some small glands," I replied.

"That is not what I mean. Is there nothing else?"

"The mesentery, do you mean, Sir?"

"Yes," he said. "Where does the chyle go after it enters the receptaculum chyli?"

"It passes up by the thoracic duct to the left subclavian vein and mixes with the blood, from thence it passes with the blood into the right auricle of the heart."

"What pushes it to the heart?"

"Its own contraction and the pulsation of the aorta. the thoracic duct also has valves."

"What prevents the chyle regurgitating when it enters the vein?"

"There is a valve that prevents its return."

"Proceed in the circulation."

"The blood is propelled from the right ventricle into the lungs."

"By what vessel?"

"The pulmonary artery."

"What peculiar structure has the pulmonary artery?"

"It is said to form spiral lines around the extremities of the air vessels."

There was some confusion in a question asked here, in other words, there were several statements made. One question I recollect was what effect respiration had on these spiral lines.

"They are compressed by inspiration," I replied.

"Is the blood quickened by respiration?" asked Dr Rand.

"Yes."

"How is the blood brought back from the lungs?"

"By the pulmonary vein into the left auricle, next into the ventricle, from thence it is protruded into the aorta and conveyed throughout the body. The aorta ascendens sends off the carotids and subclavians, the right carotid from the subclavian, and left from the aorta itself."

"What arteries convey the blood to the head?"

"The carotids and vertebrals."

"How do they convey blood for secretion to the brain by the dura mater or into the substance of the brain itself?"

"They are spread on the dura mater and pia mater, pass with it into the convolutions of the brain and into the cortex, and if there is any secretion they perform it."

Dr Rand now said, "Give us some account of the veins of the brain."

"They return the blood into the sinuses."

"Is there any peculiarity in the veins of the brain?"

"Sinuses are peculiar to the veins of the brain."

"Where does the blood

"The blood passes from the longitudinal sinus to the lateral ones, from thence to the base of the brain, and goes out at the jugular veins."

"What arteries enter the large foramen of the os occipitis?"

"The vertebral. They pass along a notch or hole in the vertebrae of the neck."

"How many lobes has the cerebrum?"

"Four."

"How many has the cerebellum?"

"I believe it consists but of one."

"What is the junction of the cerebrum and cerebellum called?"

"The medulla oblongata."

"What is it called afterwards?"

"Spinalis."

"What prevents one hemisphere of the brain from falling upon the other?"

"The processus falciformis."

"Where does it arise?"

"From the crista galli and proceeds along the sagittal suture."

"What are the lymphatics of the brain, is there any other system of vessels, and do the arteries terminate in them?"

"No, Sir," I answered. "The lymphatics arise from cavities, interstices of fibres and the parenchyma."

"Where do the lymphatics of the lower extremities go? Suppose a wound in a lymphatic and a virulent matter introduced, where will it appear?"

"In the groin."

"Right," said Dr. Rand. "Where do they go next?"

"They pass into the receptaculum chyli, and mix with the chyle."

"Do they come from all parts of the body?"

"Yes."

"Name the bones of the head."

"The ossa parietalia joined together by the sagittal suture, os frontis joined to the parietalia by the coronal suture, ossa temporalia by the squamous sutures, os occipitis by the lambdoidal suture, os sphenoidis by the squamous and transverse sutures and the os ethmoides."

"What bones form the orbit?"

"Ossa frontis, palatia, maxilla superioris, os planum, os unguis."

"The bones of the face?"

"I believe there are thirteen," I answered. "I have enumerated some of them."

"Proceed with the rest."

"Ossa nasi, ossa spongiosa, superior and inferior vomer, maxilla superior and inferior."

"You have omitted ossa malarium," said Dr. Rand rather coldly. "Now give the bones of the arm."

"Os humeri, radius, ulna, carpus, metacarpus, phalanges."

"What prevents the shoulders falling in?"

"Clavicula," I answered.

"To what are they joined?"

"To the sternum and scapula."

"What process has the scapula and what is its use?"

I did not readily recollect the name and he told me. Then he asked, "What are glands and their composition?"

"They are composed of arteries, veins, and excretory ducts."

"Do arteries terminate any other way?"

"They open into cavities and on the surface of the body."

"What kind of articulation is the joint of the elbow?"

"Ginglymus," I replied.

"What is ginglymus?"

"It is an articulation resembling a hinge."

"Name another instance."

I did not answer immediately. He asked what kind of joint that of the ribs was. I did not know. He said that was ginglymus.

Then he asked, "What is it blood is composed of?"

I answered, "Salt, water . . ."

He stopped me, saying that he did not want the chymical properties but the spontaneous divisions. So I replied, "Coagulum and serum."

Dr. Lloyd now interrupted and said that he supposed I knew but that I did not recollect the proper term. Dr. Rand said that I meant crassamentum, and that there was another part, too,—coagulable lymph,—which had not been mentioned. I told him this element required an operation to be recognized but he answered that it needed only a little whipping.

At about this juncture Dr. Rand was asked by the other gentlemen to desist as time was failing. So he said, "It is your turn now, Dr. Gardner, to examine the candidate in the practise of physic." After this, Dr. Rand took out his watch every few minutes and complained constantly as long as the examination lasted that time would fail unless they made haste.

Dr. Gardner began with, "What is inflammation?"

I replied, "An increased action of the vessels of any part."

"What are the causes?"

"Anything that irritates or excites the arterial system to greater motion."

"Well, suppose a man had an inflammation in his leg, what would you do?"

I made some pause until he went on, "I mean a phlegmon, I wish to be understood. What would you do?"

"I would first endeavor to discuss or resolve it."

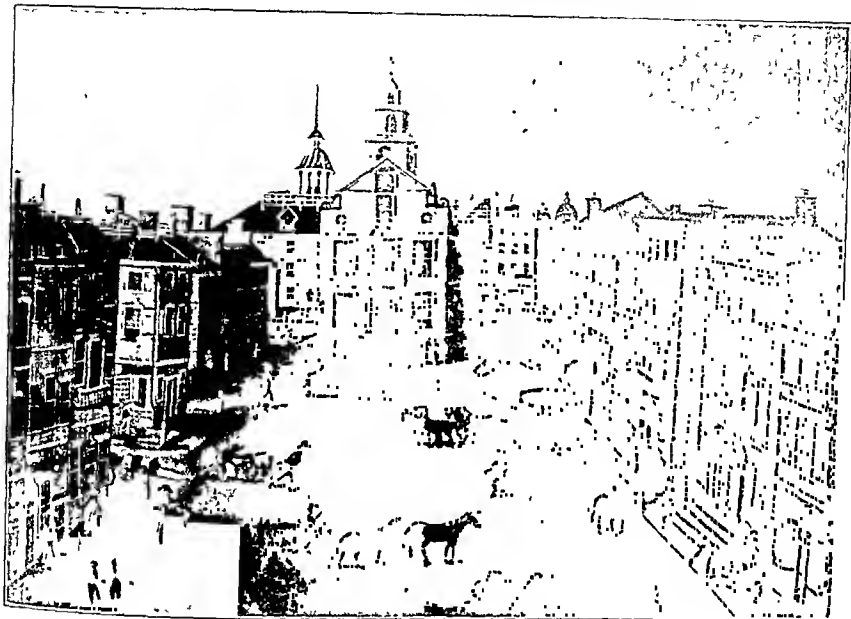
"What are the terminations of inflammation?"

"The common terminations of inflammation are in resolution, suppuration, gangrene or mortification."

Dr. Rand interrupted. "How about fomentations?" I said I would use them also. Dr. Gardner went on. "What do you mean by emollients?"

"Such things as will take off the stricture of the vessels and allow of an effusion from them."

"What is a pleurisy? How do you know a person has got the pleurisy?"



MASSACHUSETTS HISTORICAL SOCIETY

FIGURE 1. *The Massachusetts Medical Society in 1788.*

The Council met in the State House; the censors met in the Court House on Queen Street, the building on the right with the cupola.

"By what means would you resolve the inflammation?"

"By allaying the increased action of the vessels."

"How?"

"By astringents and sedatives."

"What kind?"

"Sometimes cold water is used, or saturnine applications."

"Suppose you could not resolve it?"

"If after endeavoring all in my power to resolve the tumor I should find it could not be done, I would bring it to suppurate."

"To mature, yes," said Dr. Gardner. "Well, by what means?"

"By emollient cataplasms."

"Pleurisy is known by a pain in the side, tightness over the chest, a cough, a fever."

"What are remedies to be used?"

"The chief remedy is blood letting."

"How soon would you bleed a second time?"

"If the pain of the side was great and respiration greatly obstructed, I would repeat the bleeding in a few hours."

Dr. Rand interrupted by asking how much blood a man could afford to lose. I replied, "I think I have seen an author who says we may take away as much as three or four pounds."

"Did you ever read Sydenham?" asked Dr. Rand.

"No," I answered.

"You ought to," replied Dr. Rand. "He says about forty-two ounces." But the other examiners all then said much more was frequently taken. After this interruption, Dr. Gardner continued, "What else would you do?"

"I would blister the side and if the patient would bear no more bleeding and symptoms continued violent, I would cup and scarify the side and draw some blood that way."

"Would you do anything else?"

"I would use demulcents for the cough."

"What demulcents?"

"Flaxseed tea and such things," I answered. "I would also use diluents and nauseating doses to determine to the surface and relieve the extreme vessels. I would keep the body open and soluble."

Dr. Rand now interrupted by asking, "What is a bilious fever?" I was considering what description it would bear when he said it was a typhus he meant, which rendered the matter more obscure. I told him a bilious fever arose from acrid bile being absorbed. Dr. Rand asked, "What is the predisponent cause?" I could not tell; for I could not reconcile bilious fever and typhus being the same thing. Dr. Rand asked me if the season was not the predisponent cause and what season typhus happened in. I said, "Toward the close of summer." "Do you not mean in the autumn?" then said he. I told him I supposed heat was an occasional cause.

"No," said he. "What is the cure?"

"Evacuants, diluents and refrigerants," I replied.

Dr. Gardner asked what I meant by diluents. I replied, "Water and teas that contain a great deal of water."

It was now Dr. Lloyd's turn to question me in Surgery. Said he, "You have seen amputations. Describe one, for instance below the knee."

I answered, "I would place the patient on a table of a convenient height."

"Stop!" said he. "Where are your dressings?" I told him I thought it unnecessary at this time to describe such minutiae. He went into a pathetic encomium on the wisdom and ingenuity of a surgeon who should have the foresight and address to prepare every article that should be necessary. So I enumerated double-headed roller, needles, tenaculum, great knife, cutting saw and retractor.

"Where is your lint?" asked Dr. Lloyd, "and would you not have something of a pledget and a cross bandage?" I enumerated these various articles and was about to describe how I would place them all in a convenient dish. Here I was so in-

terrupted by proposals, repetitions and so many questions that I was confounded and held my tongue.

Dr. Gardner said, "Take time, my dear, we don't mean to catch you."

At last I got the patient on the table again.

"How high a table?" asked Dr. Lloyd.

I answered, "One of convenient height—about two and a half feet high."

I believe that he said three feet high, and then turning to the others said, "That is the proper height."

At length I had a chance to continue. "I would secure him by two assistants, and place the tourniquet on the artery."

"Where?"

"Toward the groin," I said, "where I could feel the vessel beat. I would have an assistant to command the tourniquet, one to draw up the skin, and another to support the leg. I would then take the great knife and desire the assistant to retract the skin a little, making the incision a hand's breadth below the knee."

Dr. Gardner asked me to point where, and I pointed to the proper place. Dr. Rand said, "Of course you chose this point to avoid the tendon of the patella," and I answered, "Yes." I then went on, "After I had made the incision through the cellular membrane I would beg the assistant to retract the skin and cellular substance a little, and would make the second incision as high as possible and down to the bone."

"Straight?"

"Yes." I was going to apply the retractor when Dr. Rand asked, "Where is your catlin? If there is a portion of muscle undivided between the bones the catlin must be used." This interruption made me forget the retractor and they said nothing about it, so I continued. "I would then take the saw and saw through both bones and take the limb away. After clearing away the blood I would ask the assistant to loosen the tourniquet; whatever arteries I could find I would draw out with the tenaculum and have an assistant to tie them, repeatedly requesting the person who commanded the tourniquet to loosen it that I might discover the arteries."

Dr. Rand interjected another question. "Would you not wipe away any clotted blood with a sponge?"

"Yes."

"What would you do next?"

"I should draw the lips of the wound as near together as possible over the bones and secure them by ligatures."

'By needles do you mean?' asked Dr Rand

Undesignedly I said, 'Yes,' and immediately he said he should not think of it unless the lips of the wound were flabby. While he was saying this I saw the error I was led into and interrupted him 'I would secure them with sticking plaster,' I said, 'and then I would apply a pledget of some emollient ointment.'

'No lint?'

'No,' I answered. They then consulted together and concluded that lint was necessary. At length I continued 'I would place on the cross bandage and apply the roller.'

'How long should the bandage be?' asked Dr Lloyd

'Four yards would bring it round the thigh and secure it'

'Would you not secure it to something passed around the waist?'

'Yes. I would then get the patient to bed'

Dr Gardner asked me what to do afterwards. I said I would bleed if the pulse was hard and full. Dr Rand asked what should be done if the patient was irritable. I said 'If the pulse was low and the patient exhausted, I would give him bark and wine.'

Their frequent complaint of want of time and my expectation of being asked many more questions induced me to answer much quicker than prudence otherwise directed. But I recollect no other questions in surgery and I think I am able positively to say there was no other of any sort. Drs Rand and Gardner seemed by their motion to be done.

Dr Lloyd now drew out of his pocket a paper and said he had some more questions to ask me.

'What are the dimensions of the pelvis?'

I replied, 'Shall I mention bones first?'

'No, it is no matter'

The shortest diameter of the pelvis, from the base of the sacrum to the pubes, is about four inches and a half. From one ilia to the other, or from one side to the other side of the brim, five and a half inches.

Dr Lloyd said from side to side it was called, and Dr Rand asked if I meant from the spines to the ilia. I replied I meant the brim of the true pelvis.

'How is labor brought on?'

'About the ninth month, from the largeness and strength of the child, the uterus is excited to contraction, the abdominal muscles are brought into action by sympathy and thus are the throes of the woman produced.'

'How are labors divided?'

'Into natural and preternatural labors.'

'What is to be done in a natural labor?'

'We must do nothing but wait till nature expels the child.'

'Would you not set by the woman?'

'Yes, Sir,' I answered, 'and feel now and then if the child be in the right position.'

Dr Lloyd warned me that if I did not, I would soon lose all my business. Then he entered into another descant on the prudence of preparatory measures. I said I thought he only wanted me to give the fundamental principles. Dr Rand interrupted by saying 'Would you not support the perineum?'

'Yes,' I explained. 'What I meant by doing nothing is that we should use no violence.'

'You would receive the child, I suppose?'

'After the child was born I would tie the funis at about three fingers breadth from the navel, and cut it at nearly the same distance from the ligature. I would twist the navel string round the fingers of my left hand and introducing my right would take hold of the cord higher up. When the pains of the mother came on, I would pull down by the funis gradually at first in the direction of the coccyx, and moving it backwards and forwards would at last disengage the placenta.'

'Suppose the placenta will not come?'

'It is customary to desire the patient to blow in the fist, to cough and the like.'

'Suppose too there is a flooding?'

'I would extract the placenta as soon as possible, especially if the woman show any signs of deliquium.'

'Suppose the placenta still would not come?'

'I would introduce my hand into the womb and endeavor to separate it.'

Now Dr Rand said, 'Suppose the woman faint and the flooding stopped, would you now think of extracting the placenta?' I am not certain how I answered this question.

'What is a laborious labor?' continued Dr. Lloyd

A laborious labor is when the child cannot be delivered without the use of instruments.'

Dr Rand said he believed I was mistaken. A laborious labor was when the head was large and the pelvis small or rigid. I told him that Orme called such labor a lingering labor, but when recourse was to be had to instruments he called the labor laborious.

'Give us an instance of preternatural labor, how to deliver a breech or, let us say, an arm presentation.'

'When the arm presents and the os uteri is sufficiently dilated, break the membrane and push

up the body. at the same time endeavor to get the feet; having got them extract by the feet."

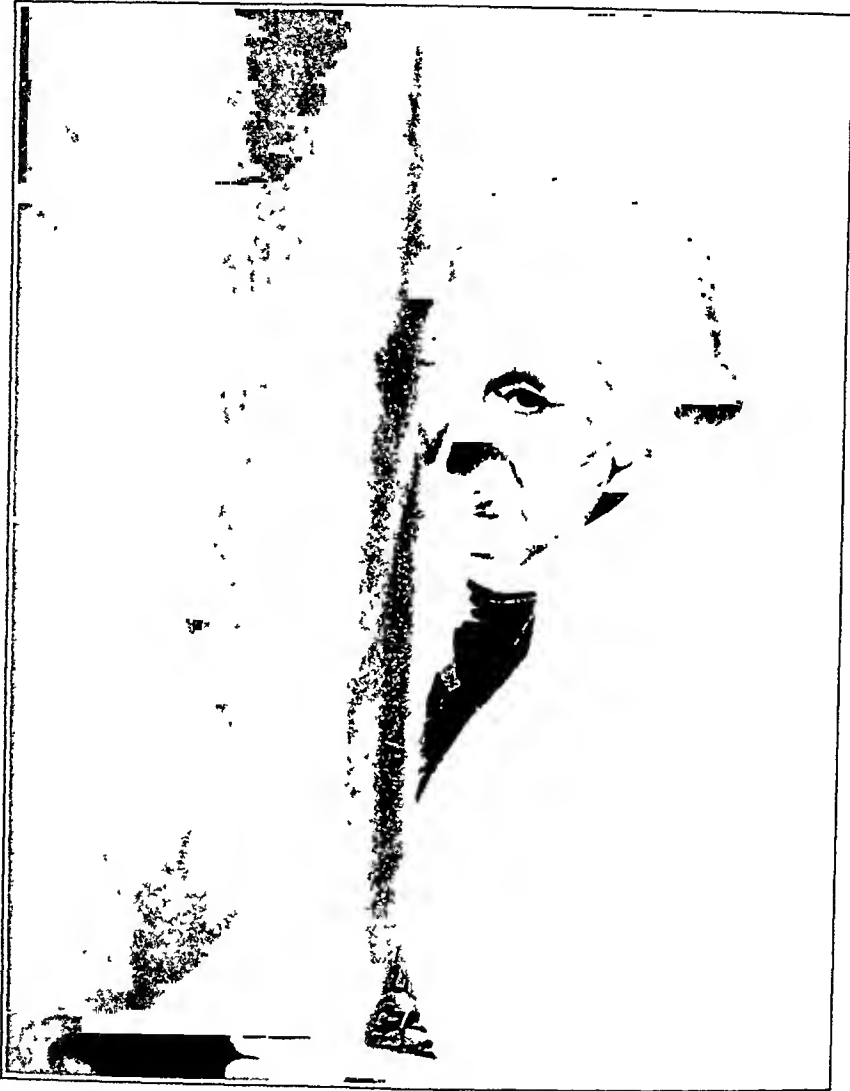
"How is it in the case of twins?" asked Dr. Lloyd.

"The twin case is merely like the others."

"When one child is born what do you do?"

"Suppose the placenta adheres to the os uteri when labor comes on, or when by introducing your finger in the os uteri you can feel nothing but the placenta, what is to be done?" asked Dr. Lloyd.

"I would separate the adhesion and deliver the child as soon as possible."



BOSTON MEDICAL LIBRARY

FIGURE 2. Dr. James Lloyd.

A leading surgeon and obstetrician of Boston and a conscientious censor of the Massachusetts Medical Society.

"Wait for the descent of the other."

"If," said Dr. Rand, "after the first child be born and you have cut the navel string, and after the first gush of blood is over bleeding should continue, what would you think of?"

"I should suspect another child and would secure the funis and wait for the other child."

"Should you not extract the placenta?"

"No," I answered.

"Suppose the other should not readily come?"

"After some time I would feel for it and extract it."

"Suppose during this time the woman floods or bleeds to death?"

"I know of no way to prevent it."

"Did you ever read of such a case?" said Dr. Rand.

"I do not recollect. Dr. Warren told me once of having such a case."

Dr. Rand once again interjected his ideas. He asked me if I had ever examined a placenta. If I had, he said, I would know that it is divided into lobes and that these were connected together by cellular membrane. "In this last case, these lobes

should be divided by the finger and the cellular membrane should be separated: this may be done without effusion of blood." I asked the doctors if cases of this character were not generally fatal. They all answered, "By no means."

"How do you distinguish pregnancy from amenorrhoea?" finally inquired Dr. Lloyd. Before I

The question subsided and I was dismissed. After this ordeal, I realized that all medical knowledge was not shut up in the brains of my professors.

* * *

John Fleet was a member of the first class to graduate in medicine from the Harvard Medical

Course of Examination.

Dr. Rand. Describe the process of deglutition? The food is first taken into the mouth, divided by the teeth—pushed backwards by the muscles of the throat. Is there any thing to prevent it from passing into the trachea? The glottis is immediately added; the epiglottis, I mean—that covers the glottis. What is the epiglottis? a cartilaginous substance. Proceed in the process? The food is pushed into the oesophagus & passes down to the stomach; is there mixed with the gastric juice & operated upon by the stomach; if a vegetable food be used a fermentation takes place. What is the upper orifice of the stomach called? Cardia. What the other? Pylorus. It is next introduced into the duodenum, there it mixes with the pancreatic juice & bile. What conveys the bile into the duodenum? Ductus communis, & duodenus. Does the hepatic duct enter the duodenum? Ductus communis & duodenus. Almost always. Proceed with the food? The food being mixed with the bile & pancreatic juice & what use is the bile? It is indigestible, he repeated the question. It appears to form chyle I answered. Go on? It goes into the small intestines, the chyle is absorbed by the lacteals. What are the lacteals? Vessels that convey chyle to the receptaculum chylei (Dr. Gardner asked where does it lie? I do not exactly remember upon which vertebra of the loins) What does the chyle pass through in going to the receptaculum chylei? Muc.

MASSACHUSETTS HISTORICAL SOCIETY

FIGURE 3. A Page from Dr. John Fleet's Examination Notes.

"These notes were taken the evening and day following my examination, being advised so to do before examination as a matter of satisfaction." Their accuracy was solemnly attested to before J. Brooks, justice of the peace.

had a chance to reply, Dr. Gardner got up and said with some exclamation, "Don't ask him that question for I never knew myself!"

School and was the first assistant appointed in the Department of Medicine. He was the first librarian of the Boston Medical Library.

He wrote his account of his examination by the censors of the Massachusetts Medical Society in the evening following the afternoon on which it was given. The manuscript was found recently in the Massachusetts Historical Society and is now printed through the courtesy of Mr. Allyn B. Forbes. It has been edited slightly by Dr. Reginald Fitz.

The censors did not consider Dr. Fleet's per-

formance on the occasion passable. He was made to undergo re-examination a few weeks later, when he passed with flying colors.

The questions asked and the answers given serve not only as an example of an early general medical examination but also reflect fairly representative New England medical opinion in that era.

DIAPHRAGMATIC HERNIA PRESENTING THE CLINICAL PICTURE OF ACUTE COR PULMONALE*

Report of a Case

SYLVESTER MCGINN, M.D.,† AND LOUIS M. SPEAR, M.D.‡

BOSTON

THE acute cor pulmonale was originally described¹ as a sudden distention of the chambers of the right heart as a result of an obstruction to the pulmonary circulation by a pulmonary embolus. A case of acute cor pulmonale has recently been observed, however, in which interference with the pulmonary circulation was caused by a diaphragmatic hernia. The case is interesting because of the age of the patient, because it was one of the first cases of diaphragmatic hernia to be recognized by roentgenogram, and because of the similarity of some of the symptoms to those of coronary disease and diaphragmatic hernia. The recognition of these clinical conditions and the establishment of the correct diagnosis may completely alter the prognosis and may change the therapy to include lifesaving surgical measures.

Cyanosis always suggests the possibility of a cardiovascular abnormality, and the commonest cause of its acute form is pulmonary embolism followed by an acute cor pulmonale. Brewster² and Stoll³ have reported 2 cases of diaphragmatic hernia, however, in which the outstanding features were cyanosis and dyspnea. Not infrequently, symptoms caused by diaphragmatic hernia have been erroneously attributed to cardiac disease. Healey⁴ noted that substernal discomfort, sometimes with left shoulder pain, and regurgitation of food when the patient was in the supine position were the commonest complaints of 53 of the earliest reported cases of diaphragmatic hernia. Stobie⁵ has reported that in addition to gastrointestinal symptoms, patients with this condition may have

mid-epigastric distress, with pain referred to the shoulder and down the arm, palpitation, tachycardia and dyspnea. Roch⁶ has discussed a case of angina pectoris that was falsely diagnosed because of symptoms associated with a diaphragmatic hernia. Electrocardiographic changes depending on the gaseous distention of a diaphragmatic hernia have been observed by Kalk and Koelsch⁷ who believe that there are variations in the coronary blood flow due to vagal irritation caused by the hernia.

CASE REPORT

An 81-year-old woman entered the hospital for the third time on March 13, 1940. She had been quite well until 1919, when she was first troubled with attacks of difficult breathing and pain in the left precordium. It was thought that she did not have angina pectoris. There had been one severe attack marked by dyspnea and cyanosis that was similar to the one described in the present illness. Physical examination at that time was negative, except that the blood pressure was 180/110, and the heart was enlarged to the left.

In 1925, a secondary anemia was found, and this condition persisted throughout the rest of her life. Roentgenograms made in 1930 showed a diaphragmatic hernia (Fig. 1). A fall in 1931 resulted in a fracture of the tenth dorsal vertebra, the treatment of which was complicated by the inability of the patient to wear a cast or to be maintained in the recumbent position. A dorsal kyphosis became increasingly noticeable after this accident. In October, 1939, she was again examined for a questionable angina pectoris, and an electrocardiogram was taken (Fig. 2). She had been suffering from mid-epigastric, low substernal distress and indigestion after meals. It was concluded that these symptoms were caused by the herniation of the stomach and were not of cardiac origin.

One week before admission, the patient became overtired and remained in bed for 3 days. The liver edge was palpated below the costal border, but except for fatigue, she seemed in her usual health. On the day of admission, she was drowsy, although she could be aroused.

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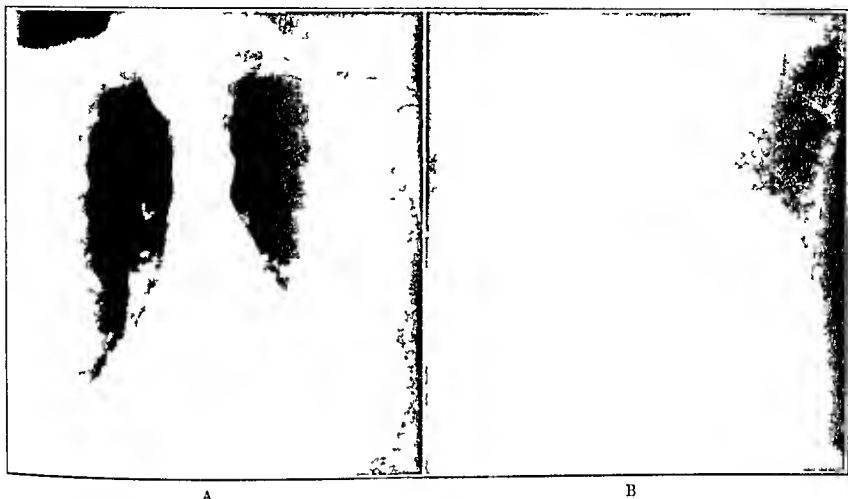
‡Chief of the Medical Service, Robert Breck Brigham Hospital.

Respirations were rapid and shallow, and the lips and fingernails were very cyanotic. There was no pain at any time.

Physical examination showed an elderly woman with increased shallow respirations. Cyanosis of the nails, lips, ears and cheeks was marked, and there was marked blueness of the skin. The neck veins were greatly distended. The pulmonic second sound was accentuated and was much louder than the aortic second sound. Neither of these findings was present 2 days before admission. The heart was enlarged in the region of the

On the 4th day after admission, the patient was unable to take nourishment and became much weaker. The temperature rose to 103.2°F, and the pulse rate was increased to 130 at intervals throughout the day. Bronchial breathing was heard over the left lung posteriorly. The patient expired on the 5th day after admission.

Autopsy. A post mortem examination was made by Dr J. B. Hazard. Kyphosis of the thoracic spine was present and dependent lividity was marked. About 200 cc of amber fluid was found in each pleural cavity. The entire stomach, as far as the pylorus, projected into the



A

B

FIGURE 1 X-Ray Films Taken on June 9 1930

A—Herniation of the stomach through the diaphragm (film taken before the barium meal)

B—Barium filled stomach showing the cardiac end protruding through the diaphragm of the esophageal hiatus and extending into the right thorax behind the shadow of the heart

left ventricle, the mid-clavicular line equalling 8 cm. the left border of dullness and maximal apex beat was in the fifth interspace, 10.5 cm from the midsternum. The heart sounds were of good quality without significant murmurs and were regular except for extrasystoles; the rate was 78. The blood pressure was 155/90. A few fine rales were heard at the left lung base. The lower edge was palpated three fingerbreadths below the costal margin. Varicose veins and slight pitting edema were present in both legs.

The patient's condition improved slightly when she was placed in an oxygen tent. It was observed that she was very cyanotic while the oxygen tanks were being changed. It was believed that the liver was not so enlarged as it had been on admission, but palpation was difficult owing to abdominal distention, which markedly intensified the cyanosis.

A roentgenogram of the chest was taken with a portable machine and an electrocardiogram was made; the interpretations accompany the illustrations (Figs 3 and 4). The nonprotein nitrogen was 45 mg per 100 cc, and the white cell count 8650.

right thorax through an opening 6 cm in diameter in the diaphragm at the esophageal hiatus. It was covered by a thin fibrous layer continuous with the diaphragmatic leaves. The left lung weighed 380 gm, the right 570, and both the right and left lower lobes were flabby, airless and, on section, purplish red. The upper lobes were grayish, hypercrepitant and easily compressed. The primary bronchi were purplish gray, and their mucosa purplish red. The branches of the pulmonary artery were wide, but the walls were of average thickness, with only occasional small yellowish plaques. No evidence of ante mortem clot was found.

The heart weighed 500 gm and the right auricle and ventricle were dilated. The right ventricular wall measured 0.8 cm in thickness and the left varied from 1.5 to 1.8 cm, both ventricles being enlarged. The foramen ovale was not patent, and the valves were normal. The coronary arteries were patent throughout although there was some diminution in the size of the lumen of the left descending branch secondary to thickening of the intima and calcification.

The liver and spleen appeared to be enlarged, with

approximate weights of 1800 and 300 gm. respectively, the organs not being removed. The stomach presented a purplish-gray mucosa as far as the pylorus, where it assumed a grayish tint. No evidence of necrosis of the gastric wall was found. The kidneys appeared grossly to be of average size, with a purplish-red, slightly granular surface.

Microscopic examination of the sections from the low-

marked right ventricular hypertrophy and dilatation (cor pulmonale), left ventricular hypertrophy, pulmonary atelectasis (right and left lower lobes), pulmonary emphysema, diaphragmatic hernia of stomach into the right chest, passive hyperemia of the stomach, passive hyperemia of spleen and liver, and slight bilateral hydrothorax.

For many years the patient had a diaphragmatic hernia, apparently of congenital origin. It is of interest that despite this deformity she lived until her eighty-second year in average good health, but that the condition finally caused her death. A secondary anemia had been present for a long time, and is best explained as due to slow bleeding from hyperemic and congested vessels in the gastric mucosa, as the microscopic sections from the stomach wall suggested. This indicates that there was an interference in the blood supply to the stomach, and that there was an impairment to the venous return flow by constriction at the point of the passage of the stomach through the diaphragm. The association of a secondary anemia and a diaphragmatic hernia has been pointed out by Bock, Dulin and Brooke.⁸

The patient had a mild hypertension, which undoubtedly caused hypertrophy of the left ventricle and contributed to the cardiac enlargement. The right ventricular wall measured 0.8 cm. in thickness; this hypertrophy indicated a chronic cor pulmonale. Right ventricular strain in this case resulted from an increase in pulmonary pressure due to emphysema, which was compensatory to either or both the kyphosis and the fact that the herniated stomach was occupying space in the thoracic cavity that should have been available to the lungs. In addition to the chronic cor pulmonale, marked dilatation of the right auricle and ventricle were observed and confirmed the clinical impression of an acute cor pulmonale. The increase in the venous pressure was shown by the distention of the neck veins, and the increase in pulmonary pressure by the accentuation of the pulmonary second sound. Judging from the roentgenograms, about one third of the stomach was usually present in the chest, and apparently the entire stomach suddenly herniated through the esophageal hiatus into the right thoracic cavity. The lower lobe of the right lung and, to a lesser extent, that of the left lung were compressed and became atelectatic. This caused an acute rise in pulmonary arterial pressure, and the right heart, which was already weakened by chronic strain, became dilated and failed. Evidence of the amount of pressure exerted by the stomach on the lungs can be appreciated when it is considered that the liver was displaced downward three fingerbreadths below the costal margin. The liver edge was palpated at varying points

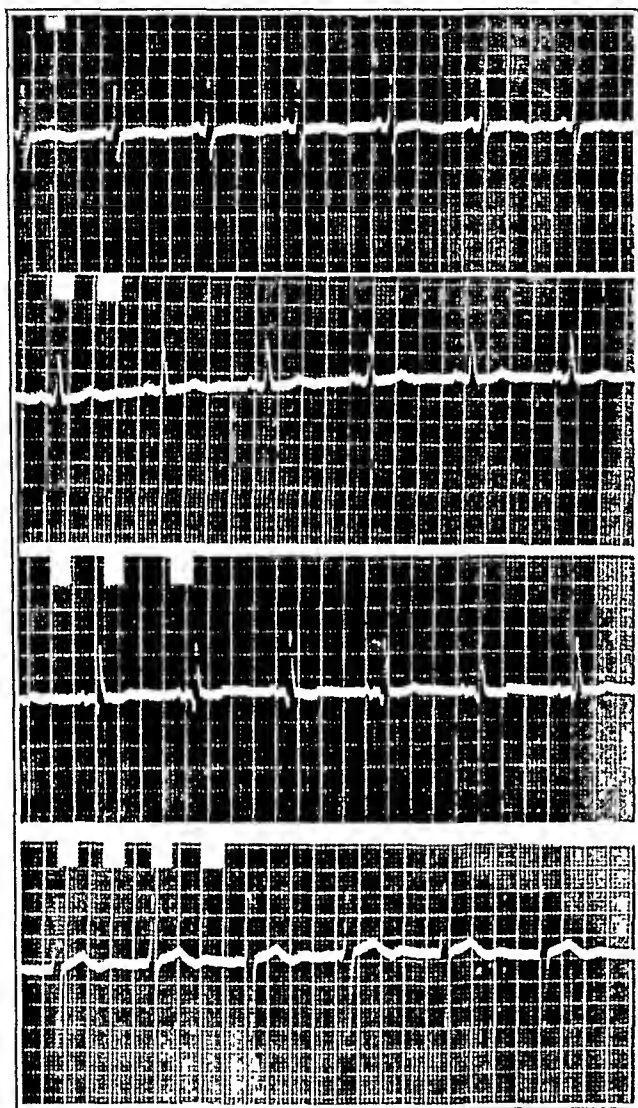


FIGURE 2. Electrocardiogram Taken on October 25, 1939.

There are normal rhythm, a rate of 70 and low T waves in all leads. The deep S wave in Lead 1 indicates a tendency to but not definite right-axis deviation. In Lead 4 the R wave is present, and there is a prominent U wave.

er lobes of the lungs revealed extensive hemorrhage into the alveoli; the alveolar walls were closely approximated. The connective tissue contained an infiltration of lymphocytes. Sections from the upper lobes showed distended alveoli with thin walls. Sections from the stomach wall showed the vessels to be engorged with blood.

Clinical diagnoses: Acute dilatation of the right side of the heart, probably due to a pulmonary embolus, diaphragmatic hernia, hypertensive heart disease and arteriosclerosis.

Anatomical diagnoses: Kyphosis of the thoracic spine,

below the ribs, depending in all probability on the amount of air in the stomach and not on passive congestion, as we had thought before the post-mortem examination. The latter examination likewise failed to demonstrate emboli in the pulmonary arteries, which we had believed responsible for the condition, even though we were fully aware that there was also a diaphragmatic hernia. The outstanding clinical signs of cyanosis and dyspnea can be readily explained by the acute cor pul-

nite right-axis deviation. The T waves in Leads 1, 2 and 3 were low. It was believed that the tracing showed no evidence of significant coronary disease. The electrocardiogram made on March 14, 1940, the day after admission to the hospital and four days before death, differed considerably from the previous tracing. Marked right-axis deviation was present, and although the T waves in Lead 1 were still low, those in Leads 2 and 3 showed late and deep inversion. R waves were

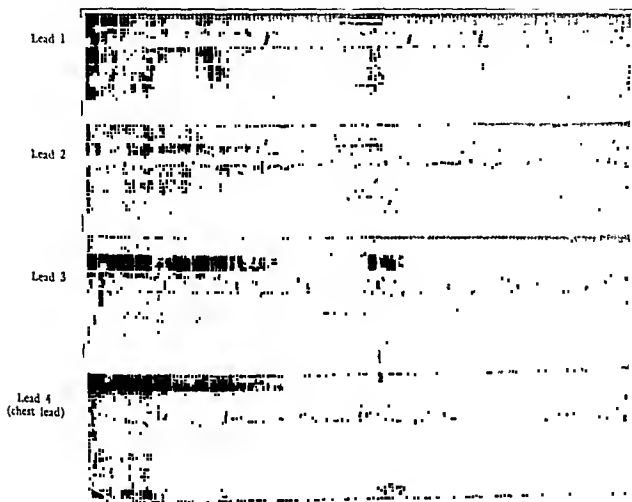


FIGURE 3. *Electrocardiogram Taken on March 14, 1940.*

There are normal rhythm, a rate of 80 and low T waves in Lead 1 (as before), but also late and deep inversion of the T waves in Leads 2 and 3 and very deep S waves in Lead 1, indicating marked right-axis deviation. In Lead 4, the R wave is present and there is high origin of the T wave. There are prominent U waves in Leads 1 and 4.

monale. It is likely that the attack of cyanosis and dyspnea in 1919 was similar to the final illness, except that the hernia reduced itself at that time.

Roentgenograms made in 1930, which were the earliest we could locate, showed part of the stomach herniating through the diaphragm into the right chest. The picture made on the day after admission, four days before death, revealed that a larger portion, if not the entire stomach, had herniated through the esophageal hiatus and had replaced the usual dense shadow of the liver. The lung fields failed to show definite evidence of infarction, and the mottled dullness above the outline of the stomach was due to atelectasis. The heart shadow was enlarged at both examinations.

The electrocardiogram made on October 25, 1939, showed a prominent S wave in Lead 1, but no defi-

present in Lead 4, but there was high origin of the T waves. It was concluded from this electrocardiogram, together with the clinical history and the previous tracing, that an acute cor pulmonale was present.

The substernal discomfort created by a diaphragmatic hernia may readily lead to the diagnosis of angina pectoris, but the symptoms of the former condition are invariably provoked by eating and by the recumbent position rather than by exertion. The clinical picture of the present case was indistinguishable from that of an acute cor pulmonale, which we had always previously thought to be the result of an embolus in the pulmonary circulation. A roentgenogram can immediately produce evidence to differentiate these three clinical conditions; it is essential that they be diag-

nosed correctly, for the prognosis is serious in two of them, whereas patients with diaphragmatic hernias may live comfortably for many years.

If the condition illustrated by this case should be encountered again in a younger person with



FIGURE 4. X-Ray Film Taken on March 14, 1940.

The greater part of the stomach occupies the lower right thorax and replaces the usual density of the liver. A mottled area is seen above the stomach shadow. The heart is enlarged and obscures the left lung base.

a more favorable operative outlook, surgical reduction and repair of the hernia would be seriously considered. Surgical discussions of this type of hernia are numerous, among them being those of Truesdale⁹ and Sloan.¹⁰ In 210 cases of dia-

phragmatic hernia surgically treated and reported by Harrington,¹¹ 195 patients were relieved of symptoms, 6 hiatus hernias recurred and 9 patients died. These data indicate definite improvement in the operative treatment of diaphragmatic hernias, chronic, traumatic or incarcerated, and justify surgical intervention, which in cases similar to the one reported may be a lifesaving procedure.

SUMMARY

A case of diaphragmatic hernia in an eighty-one-year-old woman is reported, including the post-mortem findings. The clinical symptoms were those of an acute cor pulmonale with marked cyanosis, dyspnea and electrocardiographic abnormalities. Compression of the lungs by an increase in the amount of stomach herniating through the diaphragm caused an acute strain on the right side of the heart. The differential diagnosis of coronary disease and diaphragmatic hernia, with possible surgical repair of the latter, is discussed.

REFERENCES

1. McGinn, S. and White, P. D. Acute cor pulmonale resulting from pulmonary embolism: its clinical recognition. *J. A. M. A.* 104:1473-1480, 1935.
2. Brewster, J. M. Acute traumatic diaphragmatic hernia, a case report. *U. S. Nav. M. Bull.* 36:572-575, 1938.
3. Stoll, H. F. Case of diaphragmatic hernia in which marked cyanosis and dyspnea were the predominating symptoms. *Ann. Int. Med.* 10:395-399, 1936.
4. Healey, T. R. Symptoms observed in fifty-three cases of nontraumatic diaphragmatic hernia. *Am. J. Roentgenol.* 13:266-271, 1925.
5. Stobie, G. H. Diaphragmatic hernia (a review of recent literature and a report on five cases). *Canad. M. A. J.* 36:136-141, 1937.
6. Roch, M. Fausse angine de poitrine. *Presse méd.* 42:1651, 1934.
7. Kalk, H. and Koelsch, K. Ueber die Auslösung von Veränderungen der Herzstromkurve beim Menschen vom Hiatus oesophageus aus. *Ztschr. f. klin. Med.* 135:537-541, 1939.
8. Bock, A. V., Dulin, J. W. and Brooke, P. A. Diaphragmatic hernia and secondary anemia: ten cases. *New Eng. J. Med.* 209:615-625, 1933.
9. Truesdale, P. E. Diaphragmatic hernia at the esophageal hiatus, the short esophagus and thoracic stomach. *New Eng. J. Med.* 212:240-250, 1935.
10. Sloan, H. G. Method of reducing large diaphragmatic hernia from above. *Ann. Surg.* 107:143-147, 1938.
11. Harrington, S. W. Diaphragmatic hernia: results of surgical treatment in two hundred and ten cases. *California & West. Med.* 51:27-31, 1939.

THE MOUTH IN HYPERPARATHYROIDISM

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BOSTON

IT HAS long been known that careful clinical and radiographic examinations of the mouth will occasionally reveal the symptoms of systemic disease. This observation has been strikingly brought out in hyperparathyroidism. This article describes a summary of the dental findings and illustrates each oral symptom of a series of 45 cases of hyperparathyroidism. The normal oral findings should lead to a more detailed examination, and not infrequently to the recognition of hyperparathyroidism.

Knowledge of the parathyroid glands has only recently evolved. It is difficult to believe that the glands were unknown until 1880, and that tumors of the parathyroid were first discovered in 1915. It is, therefore, no wonder that the dental findings are entirely new to most observers despite Erdheim's early observations on the effect of these glands on the teeth.

The clinical syndrome of osteitis fibrosa cystica has been known for a long time, but no great interest was excited until Mandl¹ in 1925 discovered, through the removal of an enlarged parathyroid gland, what caused the disease. Castleman and Mallory,² in 1934, stated that the number of cases reported at that time had reached 100. Since no investigator had reported more than 6 cases, these authors considered that the series of Albright and his co-workers,³ which numbered 20, warranted a summary on the pathology of parathyroid disease. The Massachusetts General Hospital series has, since then, grown to 51 cases, and this report covers 45 patients.

This group of cases has been studied from the dental point of view, and the dental findings have been presented elsewhere.⁴⁻⁶ The chief findings include visible or palpable tumors of the jaw, malocclusion or distortion of the normal arrangement of the teeth (motility); cystlike cavities of the jaws, diminished dental caries; osteoporosis, closely meshed trabeculae, and absence of the lamina dura.

The case history of the famous Captain Martell serves to point out the difficulties accompanying the correct diagnosis, and the post mortem findings refute the observations of others⁷ that pyorrhea

or looseness of the teeth occurs with the decalcification of hyperparathyroidism. This patient was known to have had the disease for thirteen years. He had shrunk from a tall sea captain to a bent and shortened cripple. The serum calcium had ranged from 13.1 to 16.5 mg per 100 cc, and the phosphorus from 1.4 to 3.2 mg. It required seven operations, the last an anterior mediastinotomy,⁸ to locate the parathyroid tumor. The calcium and phosphorus excretions had been distinct



FIGURE 1 Malocclusion or Jaw Distortion in Advanced Hyperparathyroidism

Note the protrusion of the lower teeth outside the upper arch. The distance was 1.5 cm in the right lateral incisor region in this case. Because of extreme prognathism the lower lip was hardly adequate to cover the new position of the mandible. The force of the tongue had distorted the mandibular arch. Despite the softness of the bone, the teeth were dislodged with difficulty at autopsy, and there was no evidence of periodontal disease. This intelligent patient said that seven years earlier, when his disease was known to have begun, his teeth were in normal occlusion.

ly elevated for a long period, and the entire skeleton was markedly demineralized.

When the patient's mouth was examined, the following dental symptoms were found, which were reported by Albright, Aub and Buier.⁴ The jaws were in marked malocclusion (Fig 1). The lower jaw was prognathous to such an extent that the entire mandibular dentition was in mesial occlu-

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sion. Several visible masses distorted the normal contour of the alveolar process. By radiogram numerous punched-out areas resembling cysts could be seen (Fig. 2). The entire mandible was osteoporotic, and in sharp contrast to well-calcified teeth. The trabeculation of the mandible and maxillas was closely meshed and similar to ground glass in appearance. The lamina dura was ab-

pleted of calcium and phosphorus that it was possible to mold the shape of the jaw by the pressure of one's fingers, yet there was no apparent lack of calcium in the teeth, clinically or by radiogram. This was more apparent at autopsy. The fingers holding the upper jaw could easily mold the maxillas to any shape. The teeth returned to their earlier position on release of pres-

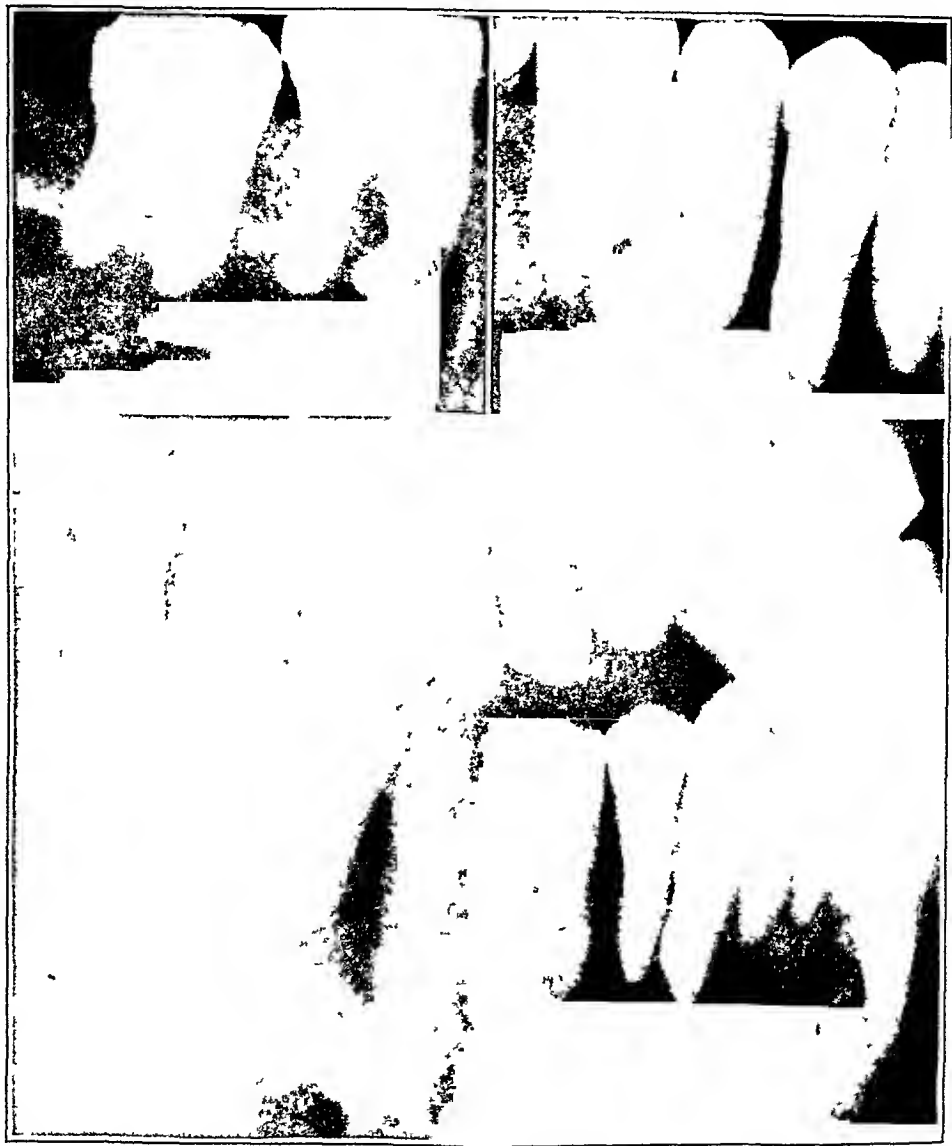


FIGURE 2. *Changes Due to Hyperparathyroidism.*

Note the lack of lamina dura, the diminished trabeculation, the remarkable contrast of the teeth against the bone, the lack of caries and the cystlike cavities.

sent from almost all the teeth. Despite this, radiographic examination showed only one or two obvious cavities. The history revealed that in the patient's numerous hospital stays for thirteen years his dental attention had been limited to one or two temporary fillings, and that his occlusion had been normal fifteen years earlier.

Here was a patient whose bones had been so de-

sure. They were not loose, and a specimen tooth was extracted only with considerable effort.

Bauer⁷ summarized the alterations in the calcium and phosphorus metabolism and said that they could be accompanied by any or all the following signs and symptoms: polydipsia, polyuria, weakness and loss of strength, constipation, loss of appetite, loss of weight, indefinite muscle and

joint aches and pains,—commonly diagnosed as "rheumatism," arthritis or neuritis,—bone tenderness, frequent fractures,—often following slight trauma,—decreased excitability of the nerves, skeletal shortening, kyphosis, bone tumors,—fre-

roidism. This also applies to certain types of bony growths, which will be spoken of below.

Malocclusion

In several cases, malocclusion or jaw distortion was one of the earliest presenting symptoms (Figs. 1 and 5). Prognathism of the mandible, which develops suddenly and without any apparent cause, especially in adults, should be regarded with suspicion. If such prognathism is associated with separation of the teeth, it may be an important clue to the early recognition of the disease. Likewise, the sudden separation of the teeth in any locality of the maxillas or mandible is to be regarded with suspicion, since it may be evidence of a tumor that by its proliferation has mechanically caused a separation of the teeth. Certainly such conditions warrant thorough x-ray study. Figure 1 shows the protrusion of the lower jaw in a patient who previous to the onset of the ailment had normal occlusion.

Cysts

Perhaps the most striking change in the jaw bone is the occurrence of cystlike cavities visible



FIGURE 3. Visible and Palpable Tumor.

This growth was biopsied and proved to be a giant-cell tumor. Note the cyanotic enlargement over the right lateral incisor and the partial obliteration of the labial fold. The patient was a young girl.

quently diagnosed as epulis of the jaw or giant-cell tumor in other bones,—kidney or ureteral stones—usually bilateral—and, frequently, anemia with leukopenia. The characteristic x-ray findings were generalized decalcification, bone tumors, multiple bone cysts and fish-type vertebral bodies. However, the earliest presenting symptom may be in the mouth, as a considerable number of the cases reported in the present paper indicate.

Tumors

Of the 45 cases, about half showed tumors of the jaw (Figs. 3 and 4); one presented large, smooth masses in both maxillary cuspid regions that were difficult to differentiate from the swellings normally found prior to the eruption of the maxillary cuspid; several presented soft-tissue masses that might have been taken for ordinary benign giant-cell tumors.

In view of the similarity in histologic structure between the benign giant-cell tumors often found in the mouth and the giant-cell tumors found in osteitis fibrosa cystica, every case presenting a nonmalignant tumor of the soft tissue should be investigated for the possibility of hyperparathy-



FIGURE 4. Distortion of the Upper Right Maxilla Due to Hyperparathyroidism.

by x-ray (Figs. 2 and 6). These may be unilocular or multilocular and may or may not be associated with pulp disease. In advanced cases the entire mandible may be honeycombed by multiple cystic cavities. Cysts of unknown origin that seem to occur independent of apical disease should create in the observer a desire to know more about their etiology.

Caries

Paradoxical as it may first seem, caries is diminished (Figs. 2 and 7). This finding attracted great interest. Here was a disease in which calcium was being extracted from ev-

bone in the body and was being excreted. If it were possible to extract calcium from already formed teeth in this disease, one would expect



FIGURE 5. *Disturbance of the Occlusion and Movement of the Teeth.*

Note the space that has occurred between the upper central incisors and between the upper right lateral and central incisors. These were not present one year previously. No tumor is visible or demonstrable, but the general decalcification of the jaws has permitted the forces of mastication to move the teeth in the direction of least resistance.

widespread caries. Instead of this, one finds the opposite. This phenomenon, which is consistently observed, indicates that calcium cannot be withdrawn through the blood stream from already cal-



FIGURE 6. *Changes Due to Hyperparathyroidism.*

Note the mandible honeycombed by multiple cystlike cavities, which may resemble the cysts that result from periodontal disease.

cified dental tissues. This opinion has found general recognition in the literature.

Osteoporosis

In the x-ray films of patients with bony changes due to hyperparathyroidism, the teeth stand out so that they seem in contrast radiopaque, whereas the bone is radiolucent (Figs. 2 and 7). In other words, in osteoporosis of the supporting bone,

when calcium has been withdrawn, the teeth remain at their usual radiopaque level.

Bone Trabeculae

What bone remains has very finely meshed trabeculae, which can hardly be seen, and appears in a symmetrical pattern of lacelike delicacy, often described by radiologists as resembling ground glass (Figs. 2 and 7).

Lamina Dura

The most striking finding is the one for which every dentist should be on the watch, since it must suggest hyperparathyroidism although it is also seen in diseases such as osteomalacia.¹⁰ It is the absence, or partial loss, of the lamina dura—the thin layer of compact bone that abuts the periodontal membrane (Figs. 2 and 7). This structure



FIGURE 7. *Changes Due to Hyperparathyroidism.*

In the upper film, note the lack of lamina dura, the ground-glass appearance of the bone (closely meshed trabeculae) and the well-formed teeth, compared in the lower film with a normal lamina dura and normal trabeculation.

has been called the periodontal lamella, the lamina dura and the linea alba. In the x-ray films, the normal image of the lamina dura is a fine, even white line less than 1.0 mm. wide, with a slight thickening at the cemento-enamel junction on each side. It is never any wider except in early life or because of disease. The lamina dura is perhaps the most delicate layer of compact bone in the body, and it is the first bony barrier that infection from caries in a tooth meets in its effort to extend itself into the tissues of the body.

The lamina dura may be entirely absent, or it may be deficient in only a few localized spots in osteitis fibrosa cystica. In the less marked cases it may be merely extremely thin.

SUMMARY AND CONCLUSIONS

The frequency with which oral symptoms appear in hyperparathyroidism suggests that manifestations about the teeth are of value in recognition of the disease.

The dental symptoms are visible or palpable tumors of the jaw, malocclusion or distortion of the normal arrangement of the teeth (motility), cyst-like cavities of the jaws, diminished dental caries, osteoporosis, closely meshed trabeculae and absence of the lamina dura.

The fact that, even in extreme cases of demineralization in hyperparathyroidism, caries does not increase is convincing evidence that the resorption of calcium and phosphorus from mature teeth is impossible by way of the blood stream.

Disorders of the parathyroid gland should be

further studied to throw light on the etiology of dental diseases.¹¹

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REFERENCES

- 1 Erdheim J Tetania parathyropeiva *Mitt a d Grenzgeb d Med u Chir* 16 632 744 1906
- 2 Mandl F Klinische und Experimentelle zur Frage der lokalisierten und generalisierten Osteitis fibrosa B Die generalisierte Form der Osteitis fibrosa *Arch f klin Chir* 143 245 284 1976
- 3 Castleman B and Mallory T B Pathology of parathyroid gland in hyperparathyroidism *Am J Path* 11 173 1935
- 4 Albright F Aub J C and Bauer W Hyperparathyroidism a common non polymorphic condition as illustrated by seventeen proved cases from one clinic *J A M A* 102 1276 1287 1934
- 5 Strock M S and Bauer W Significance to dentists of recent developments in the study of diseases of the parathyroid glands A paper read before the Harriet Newell Lowell Research Society and Harvard Dental School November 9 1934
- 6 Albright F Aub J C and Bauer W A case of osteitis fibrosa cystica (osteomalacia) with evidence of hyperactivity of the parathyroid bodies Metabolic study II *J Clin Investigation* 8 229 248 1930
- 7 Bauer W Hyperparathyroidism a distinct disease entity *J Bone & Joint Surg* 15 135 141 1933
- 8 Schour I Calcium metabolism and teeth *J A M A* 110 870 877 1938
- 9 Churchill F D and Cere O Parathyroid tumors associated with hyperparathyroidism eleven cases treated by operation *Surg Gynec & Obs* 58 255 271 1934
- 10 Albright F Hyperparathyroidism its diagnosis and exclusion *New Eng J Med* 209 476-480 1933
- 11 Albright F and Strock M S The association of calcification of dentine with hyperparathyroidism in rats and the cure of same with parathormone with some correlated observations in man A paper read by title before the American Society for Clinical Investigation May 8 1933

MEDICAL PROGRESS

PATHOLOGY

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BOSTON

THE experimental production of cirrhosis of the liver and its relation to the disease in man was thoroughly reviewed by Moon¹ in 1934. A brief summary will serve as a background for the interesting developments in the intervening years. Agreement was quickly reached by all experimenters that a biliary type of cirrhosis essentially identical with the human lesion could be produced by ligation of the common bile duct. Cirrhosis of the portal or Laennec type was first produced by Wegner² with phosphorus in 1872. In subsequent years, success was claimed for many other methods, all dependent on the use of one or another hepatotoxic agent. The methods can be roughly divided into two categories: the prolonged administration of minute, individually nontoxic doses of agents such as phosphorus,² arsenic,^{3,4} lead,^{5,6} copper,⁷ manganese,^{8,9} silica¹⁰ and tar¹¹; and the repeated use of toxic but nonlethal doses of powerful organic liver poisons, particularly halogen compounds such as chloroform^{12,13} and carbon tetrachloride.^{14,15} Opie¹⁶ added another factor by combining toxic doses of chloroform with the injection of colon bacilli intravenously, but it is im-

probable that the experimental production of cirrhosis has ever been accomplished by the use of infectious agents alone.

The cirrhoses produced resembled in varying degrees atrophic cirrhosis as it is seen in man. Using copper, Mallory, Parker and Nye⁷ produced a cirrhosis with pigmentation reminiscent of hemochromatosis. Phosphorus and lead administration were shown by Mallory¹⁷ to result in cirrhosis, with hyaline degeneration of the liver cells similar to that seen in alcoholic cirrhosis of man. Other characteristic features of the human lesion, such as extensive fatty vacuolization and reconstruction of the liver architecture, were not observed. The cirrhosis produced with carbon tetrachloride and related compounds exhibited, in the most successful experiments, pictures closely resembling the so called "toxic" or postatrophy cirrhosis of human beings. Throughout the long list of demonstrated effective agents, not one can be singled out that seems a probable cause of a significant proportion of cirrhosis in man. Most efforts to induce cirrhosis with the agent that clinical experience rates most important—ethyl alcohol—were flatly unsuccessful, and the few re-

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ported positive results were at best equivocal. After critical survey, Moon, in agreement with the opinion of the vast majority of pathologists, decided that no credible evidence of the experimental production of cirrhosis with alcohol existed.

That alcohol was not without effect on the liver could not, however, be denied. Bollman and Mann,¹⁶ like others before them, produced large fatty livers by prolonged administration of alcohol to dogs, but necrosis and fibrosis did not occur. Moreover, the administration of alcohol to dogs subsisting on a high-fat diet, which, it is well known, will of itself produce a fatty liver, markedly accelerated the rate of fat infiltration, but again no cirrhosis resulted. An adjuvant effect of alcohol in increasing the toxicity of various agents on the liver was reported by Fischler¹⁸ following the use of phosphorus, and by Lamson and Wing¹⁴ with carbon tetrachloride. Bollman and Mann¹⁵ have confirmed both experiments.

Despite the failure of so many experienced investigators to demonstrate the progression of a chronic fatty infiltration into a cirrhosis, numerous observations during the last two years indicate that this frequently occurs if the experiment is sufficiently prolonged. Allan, Bowie, McLeod and Robinson¹⁹ noted that in depancreatized dogs kept alive with insulin for long periods fatty livers regularly develop. Chaikoff, Connor and Biskind²⁰ found that in similar animals surviving for periods of two to four years the fat gradually disappeared from the liver, which grew progressively smaller and in many cases became definitely cirrhotic. The resulting cirrhosis closely resembled so-called "alcoholic cirrhosis" of man. The parallel to the not infrequent large fatty livers and the occasional development of cirrhosis in human diabetic patients was pointed out.

Pursuing this clue with vigor, Connor and Chaikoff have reported²¹ the development of cirrhosis in 4 of 16 dogs receiving a high-fat diet in addition to large doses of alcohol, and even in a number of dogs treated with a high-fat diet alone.²² It is interesting that in the latter the scarring was more diffuse and less similar to human portal cirrhosis than in the dogs that had received alcohol as well. Similarly, in rabbits, which were fed a low-carbohydrate, high-fat diet and given alcohol by stomach tube for weeks and months to the limits of tolerance, Connor²³ reports the appearance of cirrhosis in 7 of 20 animals surviving the regime for more than a few weeks. In many of the degenerating cells, coarse "hyaline" networks developed in the cytoplasm of the hepatic cells, corresponding to the picture regarded by Mallory as pathognomonic for alcoholic cirrhosis.

In human alcoholic patients Connor²⁴ has also been able at the autopsy table to trace all stages of progression from the large smooth fatty liver, which is the most constant anatomic finding in chronic alcoholism (Fahr,²⁵ LeCount and Singer²⁶), through a hypertrophic stage of cirrhosis to eventual atrophy, a progression fully confirmed in a similar study by Hall and Morgan.²⁷

Connor's success when so many others have failed can scarcely be attributed to persistence alone, and constitutes a challenge to further study and experiment. Connor himself argues for a direct metabolic effect of alcohol and suggests that it interferes with normal tissue oxidative mechanisms, as do many of the other hepatotoxic agents, such as phosphorus and carbon tetrachloride, and as certainly happens in uncontrolled diabetes. Direct evidence that ethyl alcohol exerts such an effect on the liver appears to have been furnished by Newman, Van Winkle, Kennedy and Morton.²⁸ Several other possibilities, however, are suggested by recent investigations.

Among the multitude of toxic effects attributed to alcohol in the past, recent investigation has proved one after another—peripheral neuritis²⁹ and chronic myocarditis,³⁰ for example—to be in fact manifestations of vitamin deficiency curable in many cases without deprivation of alcohol by the administration of vitamin concentrates. In this respect, it is interesting that Rich and Hamilton³¹ have been able to produce cirrhosis in rabbits with a diet deficient in vitamin B. The exact nature of the deficiency is still undetermined. Evidence points to a factor present in yeast other than vitamins B₁, B₂ and B₆ or nicotinic acid. In experiments carried from twenty-five to one hundred and thirteen days, the livers were smooth to finely granular, cut with increased resistance, and showed a diffuse cirrhosis, which was at first limited to the portal areas but later invaded the lobules. Fat was present in some specimens, absent in others. Necrotic liver cells were usually difficult to find. The cirrhosis evidently closely resembles and may actually prove to be indistinguishable from alcoholic cirrhosis in man.

Significantly different effects were obtained by György and Goldblatt,³² who used another experimental animal, the rat, with a similar deficiency of an unidentified radicle of the vitamin B complex. In contrast to the rabbits of Rich and Hamilton, the rats developed extensive focal necroses with precirrhotic changes resembling the picture of acute yellow atrophy in man. The addition of yeast extract regularly prevented this hepatic injury. Further evidence of an important protective factor in yeast are the reports by Von Glahn

14. Lamson, P. D. and Wing, R. Early cirrhosis of liver produced in dogs by carbon tetrachloride. *J. Pharmacol. & Exper. Therap.* 29:191-202, 1926.
15. Bollman, J. L. and Mann, F. C. Physiology of impaired liver. *Ergebn. d. Physiol.* 38:445-492, 1936.
16. Opie, E. L. On the relation of combined intoxication and bacterial infection to necrosis of the liver, acute yellow atrophy and cirrhosis. *J. Exper. Med.* 12:367-387, 1910.
17. Mallory, F. B. and Parker, F., Jr. Fixing and staining methods for lead and copper in tissues. *Am. J. Path.* 15:517-522, 1939.
18. Fischler, G. Ueber experimentell erzeugte Lebercirrhose. *Deutsches Arch. f. klin. Med.* 93:427-455, 1908.
19. Allan, F. N., Bowie, D. J., McLeod, J. J. R. and Robinson, W. L. Behaviour of depancreatized dogs kept alive with insulin. *Brit. J. Exper. Path.* 5:75-83, 1924.
20. Chaikoff, I. L., Connor, C. L. and Biskind, G. R. Fatty infiltration and cirrhosis of liver in depancreatized dogs maintained with insulin. *Am. J. Path.* 14:101-110, 1938.
21. Connor, C. L. and Chaikoff, I. L. Production of cirrhosis in fatty liver with alcohol. *Proc. Soc. Exper. Biol. & Med.* 39:356-359, 1938.
22. Chaikoff, I. L. and Connor, C. L. Production of cirrhosis of liver of normal dog by high fat diets. *Proc. Soc. Exper. Biol. & Med.* 43:638-641, 1940.
23. Connor, C. L. Some effects of chronic alcohol poisoning in rabbits. *Arch. Path.* 30:165-179, 1940.
24. *Idem*: Fatty infiltration of the liver and the development of cirrhosis in diabetes and chronic alcoholism. *Am. J. Path.* 14:347-364, 1938.
25. Fahr, T. Zur Frage des chronischen Alkoholismus. *Verhandl. d. deutsch. path. Gesellsch.* 13:162-169, 1909.
26. LeCount, E. R. and Singer, H. A. Fat replacement of the glycogen in liver as a cause of death. *Arch. Path.* 1:84-89, 1926.
27. Hall, E. M. and Morgan, W. A. Progressive alcoholic cirrhosis: clinical and pathologic study of 68 cases. *Arch. Path.* 27:672-690, 1939.
28. Newman, H. W., Van Winkle, W., Jr., Kennedy, N. K. and Morton, M. C. Comparative effects of propylene glycol, other glycols, and alcohol on the liver directly. *J. Pharmacol. & Exper. Therap.* 68:194-200, 1940.
29. Romano, J. Deficiency syndromes associated with chronic alcoholism: clinical study. *Am. J. M. Sc.* 194:645-651, 1937.
30. Weiss, S. and Wilkins, R. W. Nature of cardiovascular disturbances in nutritional deficiency states (beriberi). *Ann. Int. Med.* 11:104-143, 1937.
31. Rich, A. R. and Hamilton, J. D. The experimental production of cirrhosis of the liver by means of a deficient diet. *Bull. Johns Hopkins Hosp.* 66:185-196, 1940.
32. György, P. and Goldblatt, H. Hepatic injury on nutritional basis in rats. *J. Exper. Med.* 70:185-192, 1939.
33. Von Glahn, W. C. and Flinn, F. B. Effect of yeast on incidence of cirrhosis produced by lead arsenate. *Am. J. Path.* 15:771-781, 1939.
34. Rhoads, C. P. Deficiency diseases: their diagnosis and treatment. *New Eng. J. Med.* 224:493-497, 1941.
35. Best, C. H., Channon, H. J. and Ridout, J. H. Choline and dietary production of fatty livers. *J. Physiol.* 81:409-421, 1934.
36. Earle, D. P., Jr., and Victor, J. Cirrhosis of the liver caused by excess dietary cystine. *J. Exper. Med.* 73:161-172, 1941.
37. Griffith, W. H. and Wade, N. J. Choline metabolism: occurrence and prevention of hemorrhagic degeneration in young rats on low choline diet. *J. Biol. Chem.* 131:567-577, 1939.
38. Goldschmidt, S., Vars, H. M. and Ravdin, I. S. The influence of food-stuffs upon the susceptibility of the liver to injury by chloroform, and the probable mechanism of their action. *J. Clin. Investigation* 18:277-289, 1939.
39. Miller, L. L. and Whipple, G. H. Chloroform liver injury increases as protein stores decrease: studies in nitrogen metabolism in these dogs. *Am. J. M. Sc.* 199:204-216, 1940.
40. Johnson, J., Ravdin, I. S., Vars, H. M. and Zintel, H. A. Symposium on preoperative and postoperative treatment: effect of diet on composition of liver in presence of obstruction of common bile duct. *Arch. Surg.* 40:1104-1115, 1940.
41. Smith, M. I. Influence of diet on chronic toxicity of selenium. *Pub. Health Rep.* 54:1441-1453, 1939.
42. Messinger, W. J. and Hawkins, W. B. Arsphenamine liver injury modified by diet: protein and carbohydrate protective, but fat injurious. *Am. J. M. Sc.* 199:216-225, 1940.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27241

PRESENTATION OF CASE

First Admission. A fifty-six-year-old woman entered the hospital complaining of recurrent attacks of severe crampy abdominal pain of approximately two years' duration. The pain tended to be on the right side of the abdomen, often radiated to the right flank and costovertebral angle, and lasted about two hours. This symptom was accompanied by urgency, frequency, burning and nocturia. X-ray examination showed a moderate dilatation of the right ureter without apparent cause, and kidney outlines and function tests were normal. Cystoscopic examination revealed an edematous right ureteral orifice, with surrounding cystitis cystica.

The patient returned five months later with the same complaints, and tubercle bacilli were found to be coming from the right kidney. A right nephrectomy was performed, and pathological study confirmed the diagnosis of tuberculosis. During hospitalization, a gastrointestinal series, barium enema and Graham test were negative.

Final Admission (four years later). In the interval the patient had felt perfectly well until two months before admission, when she began to suffer from attacks of heavy, sometimes crampy non-radiating pain in the right side of her abdomen. The pain was not too severe, although it sometimes precluded sleep; it was more intense after meals, but it was apparently not governed by the type of food eaten. The attacks occurred at intervals, although never separated by more than a week. There were accompanying anorexia and a weight loss of ten pounds. The patient denied urinary symptoms or change in bowel habits or the character of her stools.

The patient had had measles, scarlet fever, typhoid and pleurisy. Twenty years before admission, a panhysterectomy and appendectomy had been performed, and some time later a low back fusion for tuberculosis of the spine. X-ray films showed fusion of the vertebrae from the eleventh dorsal to the third lumbar.

The patient's mother had died at fifty-four of typhoid fever, her father at sixty-eight of a stroke. Several members of her mother's family had died of tuberculosis.

On examination the patient looked tired and showed evidence of recent weight loss, but she was not acutely ill. The heart and lungs were essentially normal, the blood pressure 105 systolic, 60 diastolic. The abdomen was slightly distended, and a moderately tender, hard, somewhat irregular mass could be felt both front and back filling the right side. It moved slightly with respiration, appeared to be below the liver area, and apparently was not connected with it. Extension of the thigh with the patient lying on her stomach produced no pain. A pelvic examination was negative.

The temperature was 99°F, the pulse 88, and the respirations 20.

The urine showed a + test for albumin, and the sediment contained ten white blood cells and an occasional red blood cell per high power field. The blood showed a red cell count of 4,500,000 with a hemoglobin of 11.3 gm (photoelectric-cell technique) and a white cell count of 15,200 with 93 per cent polymorphonuclears. The serum van den Bergh was normal, and the blood Hinton reaction negative. The stools were normal.

A plain x-ray film of the abdomen showed a large sharply defined mass in the right mid abdomen, which was distinct from the lower border of the liver and measured 12 cm in diameter. A moderate quantity of gas was present in the colon, but no dilated loops of intestine were seen.

A barium enema met an almost complete obstruction in the right side of the transverse colon. A large area of ulceration was present, with marked narrowing in the proximal end of the lesion, the area corresponding to the large palpable mass. The cecum was not dilated, and only a small quantity of gas was seen in the small bowel, without dilatation.

A Graham test was positive. There was a spinal fusion of the upper lumbar vertebrae; the bones of the pelvis and dorsal spine appeared normal.

X-ray study of the chest showed marked prominence of the heart shadow in the region of the left ventricle. The lung fields were clear.

An operation was performed on the eighth hospital day.

DIFFERENTIAL DIAGNOSIS

DR RICHARD H. SWEET. By the efforts of the surgeon, we can exclude several organs from the differential diagnosis.

The stools were normal. I cannot refrain from saying that that is a significant statement if true, because as I reflect on this case the differential diagnosis can be brought down to deciding between two or three very definite conditions, all of which usually cause bleeding into the stools. Yet

the record says the stools were normal. I hardly believe it, but we shall have to accept that statement in discussing the differential diagnosis.

DR. TRACY B. MALLORY: Only one stool examination was performed, and it was negative.

DR. SWEET: It is not very unusual to have what appears to be a complete obstruction by barium enema without clinical evidence of obstruction, such as distention. The barium enema may fail to pass even when intestinal contents may pass through from above. Is that not so, Dr. Holmes?

DR. GEORGE W. HOLMES: Yes, that is true.

DR. EDWARD F. BLAND: May I interpose here? I happen to have seen the patient. The record does not mention that a Miller-Abbott tube was passed shortly after.

DR. SWEET: That might have accounted for the absence of gas. May we see the x-ray films?

DR. HOLMES: The problem, of course, is to decide what the obstruction was due to. That there was obstruction is quite obvious. It is a well-known fact that when one gives a barium enema, as Dr. Sweet pointed out, the amount of obstruction always appears greater than it does when the barium is given by mouth. That is particularly true if the lesion in the bowel is fungating. It may form a cone so that the contents of the bowel pass through readily from above, but when the flow is started in the other direction there is a valve effect. I do not know how much one can rely on it, but it is of some value. It suggests that the growth is into the lumen of the bowel, not a simple ulceration. The Miller-Abbott tube is seen in position there. There is rather more gas in the bowel than the impression gained from the text would indicate. I do not believe that the bowel is definitely dilated, but there is more in the large bowel than one would expect. Here you see the evidence of obstruction, with the colon fairly well filled, and in this film, which was taken after evacuation, the normal mucosal pattern is shown throughout the large bowel, except for the area at the point of obstruction; I should say that there is absence of mucosa into a definite conelike effect, which we usually associate with carcinoma. Apparently, the lesion is single. The remainder of the bowel is extremely normal for tuberculosis. This film shows the meal given by mouth and does not give much added information. Here is a film taken of the chest, and it rules out metastasis to the lung and also evidence of active tuberculosis. As you know, ulcerative lesions in the colon are a little commoner in active tuberculosis, and we have no evidence of that here.

DR. SWEET: The differential diagnosis obviously can be narrowed down very promptly to deciding,

as Dr. Holmes has pointed out, between carcinoma and tuberculosis. The catch is that the patient had a lot of tuberculous infection elsewhere, but I presume that she had a carcinoma of the colon. The history would go with either lesion. She had attacks of pain, suggesting obstruction. She had intermittent attacks occurring at frequent intervals, I presume growing severer as time went on. The obstruction in itself might account for a certain amount of weight loss, anorexia and so forth, so that one need not postulate neoplastic disease to explain that symptom necessarily. Let us assume that this is carcinoma of the colon. One or two things about the case are unusual. A carcinoma in the right half of the colon is often associated with a severe degree of anemia. This patient had a red-cell count of 4,500,000, with only a fairly low hemoglobin. Oftentimes the degree of anemia that we see in carcinoma of the cecum and ascending colon is very severe. That, of course, would not exclude it. Again, the stools were normal. I do not believe that any carcinoma of the colon ever existed without microscopic evidence of blood in the stools. On the other hand, the history is very short and is quite consistent with carcinoma. The location in the bowel, that is, not down at the ileocecal region, but farther up in the region of the transverse colon, is a little more in favor of carcinoma than tuberculosis; also, as Dr. Holmes pointed out, in a tuberculous lesion of this type we are accustomed to seeing evidence of disease in the chest, and although that need not necessarily be the case, it seems to me that we should expect it.

On looking at the case from the standpoint of tuberculosis, there are many things in favor of that diagnosis: the facts that the patient has had active tuberculous disease in the spine and in the right kidney, and that she had a positive family history. The clinical history of the case, the intermittent obstruction and so forth in the presence of the palpable mass would go with such a diagnosis perfectly well. But, as I have said, there is absence of active pulmonary disease, and the history is rather short. I should expect also to find a certain amount of blood in the stools with any ulcerative lesion, whether tuberculosis or carcinoma. We might mention one or two things in passing. I thought about actinomycosis until I saw the x-ray film, but now I should exclude it. Usually in association with that we see fistulas, and there were none in this case. Such things as lymphoma might be spoken of. Lymphoma of the colon is not at all unusual. I do not know enough about the interpretation of the x-ray films to know whether it has a characteristic appearance or not.

DR. HOLMES: I do not believe one can distinguish it from a carcinoma, but it is often a mul-

tipile lesion. I did not mention the possibility of a mass outside the colon surrounding it and pressing on it. The size of the mass and the fact that there was no bleeding would lead one to think of such a condition, but I do not believe it could destroy the mucosa to the extent that is present here.

DR. SWEET: Thus the fact that the mucosa had been destroyed, with evidence of ulceration, makes it appear that this was an intrinsic lesion of the bowel wall. I do not think we can go farther in discussing the differential diagnosis. At least, I cannot. Benign tumors, lipoma, myoma and so forth, would not fit the x-ray picture. Oftentimes, in my experience on exploring these doubtful cases, it is difficult by palpation or inspection of the lesion, to distinguish between neoplastic disease and tuberculosis. I think there is a little more evidence in favor of carcinoma than tuberculosis. That is as far as I can go.

DR. JOHN D. STEWART: What significance, if any, do you attach to the positive Graham test?

DR. SWEET: I noted it and meant to speak of it. I have excluded it in my mind because of the physical examination of the tumor. The tumor might have been the gall bladder pressing on the colon, but the remark is made that it was well below the liver edge, and also the x-ray film seems to put it away from the region of the liver. Of course, the kidney can be excluded because it was taken out, as was the appendix; but the patient did have that change from a negative to a positive Graham test, it is true.

CLINICAL DIAGNOSIS

Carcinoma of transverse colon.

DR. SWEET'S DIAGNOSIS

Carcinoma of transverse colon.

ANATOMICAL DIAGNOSES

Carcinoma of transverse colon, with perforation.
Pericolic abscess.

Polyposis coli.

Aspiration pneumonia.

Ileotransverse colostomy.

Operative scars: right nephrectomy; hysterectomy; bilateral salpingectomy, left oöphorectomy, appendectomy.

PATHOLOGICAL DISCUSSION

DR. MALLORY: The patient was explored, and a very large mass was felt in the transverse colon, which was adherent to the liver, omentum and gall bladder. It seemed inoperable and an ileotransverse colostomy was done, short-circuiting the bowel about the lesion. In the course of the op-

eration, difficulty occurred in anesthesia, and a large amount of gastric contents was vomited and aspirated. The patient went promptly into severe shock. She never recovered in spite of two 500-cc. transfusions, and died in a little less than twenty-four hours. At post-mortem examination, the effort was made to free up the mass, and a large abscess cavity was broken into. This showed free communication with the bowel through a perforated cancer of the transverse colon. The peritoneal cavity was quite free from reaction, and the abscess had been very well walled off. The remainder of the autopsy showed extremely wet hemorrhagic lungs, with a great deal of edema and fulminating but incipient pneumonia. There was no evidence at the time of autopsy of any active tuberculous process in the lungs, the urinary tract or the bowel. Five or six polyps were found in the colon, besides the carcinoma.

CASE 27242

PRESENTATION OF CASE

A thirty-nine-year-old woman entered the hospital complaining of blood and pus in her stools.

The patient felt perfectly well until seven weeks before admission, when she first noticed blood in her stools. Several times a day for the next four days when she attempted to have a bowel movement, nothing passed but blood, each time amounting to half a cupful. Then the patient took a laxative, and watery movements colored with blood resulted. Thereupon she consulted her physician, who made a diagnosis of hemorrhoids and prescribed a local ointment and petrolagar. There was no improvement, however, and the loose bloody stools continued. Two weeks before entry the patient consulted another physician, who advised admission to another hospital. Here a hemorrhoidectomy was performed, and the patient stated that "an abscess was found above the hemorrhoids." A rectal tube was used for three days postoperatively, and it drained a purulent material. Thereafter daily enemas were instituted, and the patient found that she was incontinent of feces, which appeared to consist of nothing more than pus. The patient had not suffered from nausea, vomiting or pain, nor had there been weight loss, but on the fourth postoperative day she believed that she had had a chill followed by fever.

On examination the patient was flushed, acutely ill and dehydrated. The heart and lungs were normal, the blood pressure 95 systolic, 60 diastolic. The abdomen was tense, but not tender. No organs were palpable, but one examiner believed a mass might be present in the left lower quadrant.

Around the anus, which drained a foul purulent discharge, were radial scars, and no sphincter

could be felt. The rectal mucosa was redundant, thick and granular, and bled easily. The examiner believed a palpable resistance was present that corresponded to the mass he had felt in the abdomen and that this mass narrowed the lumen of the bowel which was otherwise freely patent.

On vaginal examination the cervix was found to be reddened, slightly patulous and soft; it oozed a purulent discharge, which contained three or four small pieces of red-black friable material. There was slight thickening in both vaults, and the uterus was enlarged to about four times its normal size and was hard and fixed, but not tender.

The temperature was 101°F., the pulse 100, and the respirations 20.

The urine gave a ++ test for bile. The blood showed a red-cell count of 3,410,000 with a hemoglobin of 70 per cent, and a white-cell count of 6600. The nonprotein nitrogen of the blood serum was 40 mg. and the protein 6.8 gm. per 100 cc., and the chlorides were 87.9 milliequivalents per liter. A blood culture and a blood Hinton test were negative. A Frei test was negative, the cervical culture was negative for Beta hemolytic streptococci and a culture of the anal discharge yielded *Pseudomonas aeruginosa*, but no pathogens. A biopsy of the rectal mucosa showed acute and chronic inflammation.

The patient's condition never improved, foul pus continued to drain from the rectum, and on the third hospital day her abdomen was distended, the temperature 103°F. and the white-cell count 8100. A flat abdominal x-ray film showed a large amount of gas in a dilated colon, the greatest dilatation extending from the cecum to the splenic flexure. Some gas was present in the descending colon, however. The presence of air under the diaphragm could not be determined definitely. On the fourth hospital day a cecostomy and appendectomy were performed. The cecum was found to be dilated and so tense that aspiration with a needle attached to a suction tube was necessary before introducing the cecostomy tube. Histologic examination of the appendix showed acute inflammation. Although the patient's abdomen was deflated on the following day and peristalsis was active, her temperature rose to 104°F., and the white-cell count dropped to 3150. Large quantities of foul, bloody material continued to escape from the rectum, with but little discharge from the cecostomy opening. Death occurred on the third postoperative day, seven days after admission.

DIFFERENTIAL DIAGNOSIS

DR. ALLEN G. BRAILEY: May we see the x-ray films?

DR. GEORGE W. HOLMES: These films confirm

the statement made in the text that there was no visible air below the diaphragm on either side and that the colon was enormously dilated. One gets a different impression from looking at the film than from reading the text, since the dilatation is much more than an ordinary one. The haustral markings are visible. It is a queer-looking colon for obstruction. No fluid is present. It seems to stop somewhere in the region of the splenic flexure. The bowel below the splenic flexure does not seem to be dilated although there is some air in it.

DR. BRAILEY: In discussing this case, we must answer two questions: First, What was the primary condition from which the patient was suffering, and, secondly, Why did she die? I prefer to answer the second question first. I think she died of overwhelming sepsis, a conclusion that is supported by the record of high fever, falling white-cell count and rapidly fatal course. The urine was said to contain a ++ test for bile, so that I conclude that her liver was seriously damaged, and it may well have contained multiple abscesses, metastatic from the rectal bed. It is not clear whether the patient had generalized peritonitis as well as pelvic peritonitis, which she certainly had. The abdomen was "tense but not tender." Apparently the service suspected intestinal perforation, for an attempt was made to demonstrate air under the diaphragm by x-ray study.

The primary condition was some fulminating, destructive and ulcerating lesion of the rectum. In deciding its nature, I think we should consider carcinoma, ulcerative colitis, lymphogranuloma inguinale, amebiasis, tuberculosis and perhaps some rare infection such as actinomycosis. This was another case of bleeding from the rectum that was not due to "hemorrhoids." In fact, operation in this case may have opened the way for fatal spread of the infection, for the patient appears to have been singularly free from any constitutional symptoms until shortly after the operation was performed.

There is something to be said in favor of carcinoma in this case. Rectal bleeding should always suggest the possibility of carcinoma. A left lower-quadrant mass was felt both through the abdominal wall and by rectum. The uterus is said to have been enlarged, hard and fixed, which might suggest extension of neoplastic disease from the rectum. But I find it impossible to believe that a woman of thirty-nine who had no evidence of ill health eight weeks before death could nevertheless have had cancer so widespread and so ready to break down that it could produce this picture of extensive ulceration and fatal sepsis, all within a relatively few days.

I am even more willing to exclude tuberculosis

of the rectum. It is not a very common disease in this part of the world at present. Its progress is usually slow and chronic, accompanied by the development of multiple fistulas. Certainly tuberculosis alone will not explain this very rapid course. Amebiasis requires a little more attention. It can occur in very acute form, and may be accompanied by the discharge of a great deal of blood and pus. The inflammatory process and even the amebic infection itself may spread to involve adjacent pelvic organs, and, of course, its tendency to produce liver metastases is notorious. Usually this severe form is accompanied by marked pain and tenesmus, but I cannot understand why this woman did not have bowel pain, whatever her diagnosis. But amebic infection is rare in this vicinity, and this is not the common picture of amebiasis, even when it does occur, so that I am inclined to discard amebic infection as a very likely possibility. Incidentally, the disease is rather commoner in the proximal than in the distal end of the large bowel.

I am left with idiopathic ulcerative colitis and lymphogranuloma inguinale. As a matter of fact, this is an excellent description of acute lymphogranuloma involving the rectum. Almost an identical case history is given by Roudaniche, Kirsner and Palmer* in a discussion and comparison of these two diseases. The free discharge of pus and blood is characteristic. A rather serious objection is raised by the report that a Frei test was negative. A Frei test properly performed and with a satisfactory antigen is quite specific. Of course, no laboratory test is infallible, and, in fact, a few very interesting cases have been reported of very ill persons with lymphogranuloma whose Frei tests remained negative until they began to improve. These negative results have been ascribed to a state of anergy. I am therefore not willing to exclude the possibility of lymphogranuloma because of a negative Frei test, but I do think it becomes improbable.

I think that this picture could have been due to fulminating ulcerative colitis. I confess I am puzzled that this patient presented no symptoms whatever except rectal bleeding until about two weeks before her death. I am surprised that she did not have colic, tenesmus and diarrhea, but I think that the lack of these symptoms is hard to explain on any basis. I suppose that the pathologic process must have been relatively mild during the first five or six weeks of her illness, with perhaps only a few ulcerations, which happened to bleed freely, and that shortly after her operation its virulence

suddenly mounted and secondary invaders began rapidly to destroy the mucosa and apparently even the anal sphincter. I do not know whether the anal sphincter was actually destroyed by the disease process or whether its function was interfered with in some way. The x-ray films seem more striking than I had thought they would turn out to be from the record, but I do not believe there was mechanical obstruction. I think this was perhaps ileus in a terribly sick woman.

DR. RICHARD H. SWEET: That degree of dilatation in the colon is not inconsistent with a fulminating ulcerative colitis.

CLINICAL DIAGNOSES

Perianal and pelvic abscess.
Septicemia.

DR. BRAILEY'S DIAGNOSIS

Acute idiopathic ulcerative colitis.

ANATOMICAL DIAGNOSES

Acute idiopathic ulcerative colitis, with perforation.
General peritonitis.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: At post-mortem examination, a generalized peritonitis was found, with a perforation in the lower sigmoid just barely above the pelvic floor. When the large bowel was opened, it showed multiple areas of erosion, interspersed with polypoid hypertrophied fragments of the remaining mucosa extending all the way from the rectum to the cecum. When one held it up to the light, there were multiple areas where the wall of the bowel was only of paper thickness, and any one of a score of places might easily have perforated. There was no mechanical obstruction.

Nothing was found at autopsy to explain any palpable mass in the left lower quadrant. The uterus and adnexa were normal, and there was no evidence that there had been a localized pelvic abscess before the generalized peritonitis occurred.

DR. BRAILEY: What about the liver?

DR. MALLORY: It was negative grossly, and essentially negative histologically.

DR. BRAILEY: Why was the patient jaundiced?

DR. MALLORY: It was not apparent that she was.

DR. BRAILEY: How could she have a ++ test for bile without being jaundiced?

DR. MALLORY: I do not have any answer to that.

DR. JOHN D. STEWART: It is a fairly rough test.

DR. BRAILEY: Yes; I think that it is.

*Roudaniche, E. C., Kirsner, J. B. and Palmer, W. L. Lymphogranuloma venereum in relation to chronic ulcerative colitis. *J. A. M. A.* 115:515-517, 1940.

The New England Journal of Medicine

Formerly

The Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of

THE MASSACHUSETTS MEDICAL SOCIETY
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MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to *The New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

THE BISHOP'S POSTSCRIPT

IN March, 1939, the Right Reverend William Lawrence, former bishop of the Protestant Episcopal Diocese of Massachusetts, then nearing his ninetieth year, issued his postscript. Long a tiller of the soil from which are harvested the fruits of men's labors, he prepared a new field for the harvest. Over his own signature and in his own hand, under the title "My Postscript," he penned, not laboriously but with infinite patience, some fifteen hundred letters; these letters went to as many friends of the Massachusetts General Hospital,—“doctors, nurses, workers in all departments of the hospital, as well as patients; old friends of the hospital and new friends, rich and poor,”—and the purpose was to unite them in one enterprise: the building of a chapel within the hospital.

This chapel, as the Bishop visualized it and as he then expressed its use, would be not a church or a temple or even a chapel in the ordinary sense, for its purposes would transcend those of such denominational structures. Since the hospital opens its doors to succor those of all faiths, races and traditions, so also should a chapel, itself cloistered within the walls of the hospital, afford to those of all faiths, races and traditions a place of spiritual refreshment.

The enterprise prospered, with its significant appeal, quietly and surely. By the fall of 1939 over fifty thousand dollars had been pledged by more than eight hundred persons—one ward of the hospital sent four dollars and thirty cents, with the signatures of forty-one patients.

Soon thereafter the work was in progress, and in April, 1941, without ceremony, the doors of the chapel were opened that all might see its simple, lofty dignity and the rich coloring of its windows and might appreciate it as a place of peace and sanctuary.

As has been said before, the chapel is not a church, for a church implies religious denominationalism. The inspiration and the work of a Christian ecclesiastic, it is dedicated to the use of all who recognize and seek the help of a power greater than themselves; in a great house of physical healing it is a small chamber for spiritual healing.

Such a chapel, representative of all faiths in general, and of no faith in particular, is fittingly erected in a country that has dedicated itself in principle to freedom of thought and of worship, and to equality of opportunity. It is perhaps also significant that there has been faith to build such a structure for permanent use, in a time when destruction apparently reigns supreme.

HEALTH OF THE NATION AND NATIONAL DEFENSE

No one doubts that the national health is inextricably linked with the national defense. Only a healthy and united nation can hope to prepare and carry forward an adequate military program

under present-day circumstances. Nor is there much doubt—some authorities to the contrary—that a disproportionately large percentage of men called under the Selective Service Act are rejected on grounds of physical or mental defects. On the average, approximately 60 per cent of all men in Massachusetts are now being rejected by the physicians of the local selective-service boards, and, of those passed as fit for full military duty, an additional 18 per cent are turned down by induction-board physicians acting directly under the United States Army. Both boards are guided so far as physical requirements are concerned by official regulations (M. R. 1-9), and it is misleading to say that “the point of view of the army and civilian medical examiners might be expected to vary considerably concerning the acceptability of certain risks.”¹ Within reason, the rules and regulations are clear and definitive.

It therefore appears that, at least in Massachusetts, over 70 per cent of all men otherwise available for the Army are being rejected for physical or mental defects. Surgeon General Parran has correctly termed this a “national disgrace.” The problem of national health is a challenge to the medical profession. It is idle to argue that the Army regulations are unduly strict; for in modern warfare there is no place save for those who can “take it.”

On the other hand, it is comforting to know that the tuberculosis rate (standard x-ray films of the chest are taken of all men inducted in Boston) has dropped to the comparatively low rate of 0.5 per cent,² and it is of interest to note that rate of rejection for cardiovascular disease among men already passed by their local boards is almost precisely the same as it was in the last war (0.8 per cent as compared with 1.0 per cent).³ It is discouraging, however, to find that nearly 5 per cent of all men sent as physically and mentally fit to the Induction Center in Boston were subsequently rejected because of neuropsychiatric abnormalities and that from 5 to 10 per cent were returned to their homes because of insufficient teeth. Detailed figures of rejections by the local-board physicians are not available for the entire

induction period, but it is disturbing to note that of the first 3000 men examined nearly 15 per cent were rejected because of dental defects and that a very considerable percentage of all causes of rejection by the local-board physicians might properly be regarded as preventable or remediable.

“After all,” says one authority, “what can be done for flat feet, bow legs and perforated ear drums?”⁴ The implication seems to be that these causes for rejection could not have been prevented and that the medical profession has done its best, for better or for worse. It is true that little or nothing can be done for a long-standing perforation of an eardrum,—once it has occurred,—but many such chronic disabilities could have been prevented by the medical profession; bowlegs—which, incidentally, are not a cause for rejection—would never have developed under proper child hygiene, and certainly the disability arising from “flat feet” can, with a little judicious advice, be adequately and completely corrected in many cases.

Why “whistle in the dark”? Seventy per cent of the young men in this country are being judged by proper authorities to be physically unfit for “full military service.” It is for the medical profession on the one hand and the laity on the other to see to it that this percentage is materially reduced, not only in times of war but also in times of peace.

REFERENCES

1. *Medical News*. Medical Society of the State of New York. January 1, 1941.
2. Boston Induction Center: unpublished data.
3. Report of the cardiovascular consultant at Camp Devens to the Surgeon General of the United States. Unpublished letter dated April 23, 1918.

MEDICAL EPONYM

HORNER'S SYNDROME

Johann Friedrich Horner (1831-1886), professor at Zurich, published an article “Ueber eine Form von Ptosis [Concerning a Form of Ptosis]” in the *Klinische Monatsblätter für Augenheilkunde* (7: 193-198, 1869). A portion of the translation follows:

Six weeks after the last pregnancy that occurred a year before I saw her, the patient noticed a gradual drooping of the right upper eyelid . . . the pupil of the right eye was found to be definitely smaller than that of the left, the eyeball very slightly sunken. . . .

While the case was under observation, there developed before our eyes gradually increasing redness and heat of the right half of the face, although the left half remained pale and cold. . . . The patient then told us for the first time that she had never perspired on the right side. . . . I believe that in view of all these symptoms no one will question my opinion that this gradually developing, but never complete, ptosis should be regarded as a paralysis of the superior palpebral muscle, which is supplied by the sympathetic. I thus regard the phenomenon in the upper lid as a part of a larger symptom-complex.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

HEMORRHAGE AND SHOCK ASSOCIATED WITH CESAREAN SECTION AND FOLLOWED BY DEATH

A forty-year-old para II was first seen in the thirty-ninth week of her pregnancy by the physician who delivered her. She had moved into his neighborhood recently, and previously had presumably received adequate prenatal care. Her first question was, "Will you deliver me by cesarean section? I have such a horror of my first delivery that I just can't bear the thought of going through labor again."

The past history was irrelevant. The first pregnancy two years previously had terminated in a forceps delivery of a living child.

The patient was seen only once before delivery. At that time, physical examination disclosed a well-developed and well-nourished woman. The heart was not enlarged; there were no murmurs. The lungs were clear and resonant; there were no rales. The blood pressure was 120 systolic, 65 diastolic. The abdomen was enlarged to a size consistent with her dates; the fetal heart was audible.

An elective classic cesarean section was performed before labor started, nitrous oxide, oxygen and ether being used as the anesthetic. Two hours after delivery, the patient died from hemorrhage and shock. The abdominal dressing was soaked with blood, and there was reported to have been a good deal of vaginal bleeding.

Comment. One does not expect to see fatal post-partum hemorrhage in elective cesarean section, and in well-trained hands death from this

cause two hours after delivery is inexcusable. The main point to be brought out discussing this case is that cesarean section still carries hazards. It is not an operation to be undertaken without appreciating these hazards, and to do cesarean section because a patient states that she cannot stand the pangs of labor is absolutely unwarranted in this day of comparative freedom from pain afforded by modern analgesia.

WHAT A HEALTH EXAMINATION MEANS†

A hundred years ago, when Mr. Jones called in the doctor we knew that he must be very sick, perhaps dying. In those days people did not consult the doctor until they were in real trouble. Yet almost one hundred years ago, in 1850, to be exact, a prominent Bostonian, Lemuel Shattuck, was advocating a measure that called for visits with the doctor when one was not sick at all. At that time, typhoid fever, malaria, smallpox, diphtheria and similar plagues were rampant. The important advances to be made were clearly in the field of public health. Mr. Shattuck believed, nevertheless, that more attention should be paid to personal health; that people should be encouraged to have frequent "sanitary examinations" made of themselves in an effort to promote their health and to prevent disease.

Since that time, there has been a growth of the idea in certain directions, yet there seems to be a lack of enthusiasm for it on the part of the people in general and to some degree within the medical profession itself—the laymen, perhaps because it seems unnecessary to go to the doctor when one is perfectly well; some doctors, because they may think that there is not enough to be accomplished by such measures. Modern medicine surely should not be, as it has been in the past, primarily engaged with death, pain and disease, but should concern itself more with health, happiness and life.

Legend has it that the ancient Chinese paid the doctor so long as the patient remained well. Yet experience shows us that although many Orientals may live to a ripe old age, they all seem to reach the same eventual state of physical dissolution, whether they have paid the doctor to keep them well or not. Now the question is, it seems to me, whether or not such a thing as a periodic health examination can be of any real value in helping us to lead healthier, happier and longer lives.

As a matter of fact, infants and young children have examinations at fairly frequent intervals. Children of school age in many parts of this country, through the agency of the school physician and school nurse, are given some kind of a health check-up at intervals. Many adults undergo an examination when they apply for life insurance. In industry, clinics have been set up for examination of employees. There remains a tremendous group of people, nevertheless, not reached through these channels, people who have no family physician and who lack the initiative to seek out a physician in whom they can place their confidence and to whom they can turn for medical advice.

It seems to me that every adult ought to have a doctor who knows him as an individual person and who has more information about him than mere data regarding his age, weight, blood pressure, and so forth. We are all

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

†A "Green Light to Health" broadcast given through Station WAAP by the late Dr. Michael F. Murray, Jr., on Tuesday, December 17, 1940, and sponsored by the Public Education Committee of the Massachusetts Medical Society and the Massachusetts Department of Public Health.

going to need the doctor some time, and calling on a physician who has known us and who has examined us in the past is much more satisfactory from the point of view of both patient and physician than a situation in which an acutely sick person has a strange physician see him for the first time.

Another obvious consideration, of course, in having such a relation with a personal or family physician is that he gives us a thorough examination at the beginning of the relation and re-examines us from time to time for the purpose of discovering physical defects or the signs of early disease, and in general helping us in any way that he can to maintain a state of good health.

It might be well to discuss briefly what such an examination entails. The physician will ask something of one's family history, inquire into the details of one's past illnesses and will also determine whether or not one is having any difficulties at the time of the visit. He will then proceed to make a careful examination which will include the skin, eyes, ears, nose and throat, heart, lungs, abdomen, the determination of blood pressure, a search for any unusual lumps and so forth. The doctor will also take a urine sample for analysis, and may do a blood test.

My conviction is that too much stress cannot be laid on the value of the history. In recounting the illnesses, accidents, operations and trials of our past lives, we may very well give information of great importance, although it may not appear to us to be of any particular significance. In this connection, I think it is well to remember that the things we tell the doctor are held in confidence by him and there is nothing to be gained by concealing something that may be difficult to talk about. Frequently a good talk with the doctor will help straighten out troubles that are rooted in worry, fear or discouragement. Emotional difficulties, although they may not kill us, can without any doubt make us just as sick and ineffective as the grossest kind of organic disease. An organized set of emotional difficulties, by the way, has a name; it is called a neurosis. There are times when the wise family doctor can do much to help us maintain a solid emotional balance.

To get back to our examination after the history is taken, a careful physical examination is made, including the procedures already mentioned. I also believe that a Wassermann test or one of its modifications should be done. Further blood examinations may not always be necessary, but a hemoglobin determination and an examination of a blood smear ought to be included in most cases. The white-cell and a red-cell count should be determined, if indicated. In the event that these are all normal, they serve as a base line for comparison if any of them change later in life.

After these things have been done, the doctor will discuss the results of the examination with the patient and will answer his questions as adequately as possible.

Most of us will be found to be in fundamentally sound health or to have only some minor deviation from the normal. We then have the assurance that within the limits of such an examination we are in a state of good physical health.

Sometimes, of course, the physician will find the existence of definite disease and will recommend treatment, or he may find some suspicious signs for which he will ask us to report later for further observation or recommend further immediate investigation such as chest, stomach or intestinal x-ray study, blood chemistry de-

terminations or an electrocardiogram, these things being done, of course, only when indicated. A metabolism test may in some cases be recommended.

There is no reason to believe that our family doctors are unable or unwilling to take the time and pains to do a good job. Some of us may still have a picture of the family doctor as a kindly old gentleman with long whiskers who lurches Dobbin to the gatepost, comes in for a visit and hints his examination to a look at the tongue and a pat on the back. I suppose such ideas make some people prefer to place themselves in the hands of a so-called "health institute."

I know that we can find plenty of well trained physicians who are going to give us careful and competent attention, men in whom we can place our confidence. I believe that every adult ought to have such a physician as his own doctor and that a careful examination should be done at the beginning of this relation. If the person subsequently becomes ill or has some symptoms that worry him, he should report to this same physician. If he remains in a state of good health, he ought to continue to see his physician from time to time—probably best, every year, but certainly, every few years. I prefer to see my doctor every year.

If expert advice or some of the more complicated laboratory procedures are needed, our physician can help us in securing the services of the appropriate specialist. He can also be of tremendous help to the specialist in furnishing background information so necessary for the intelligent evaluation of our particular problem. In this way we can be sure that so far as the present state of the art and science of medicine goes we are getting the best. If we happen to be somebody who has a limited income we can be thankful that we live in this country where through one channel or another good medical care can be had by all. But we have to go and get it. It will not just come to us.

One may ask what kind of abnormality might be discovered at such an examination. Quite a few things might be found although if many of them existed to any serious degree the patient would probably have some kind of symptoms. One of the various anemias might be found. Sometimes the finding of a definite degree of anemia leads to the discovery of some underlying cause. Tuberculosis in its earliest stages is usually not detectable by physical examination of the chest, and would not be discovered unless it were sufficiently advanced that the patient had some symptoms or some definite physical signs. Any suspicious symptoms, such as persistent cough or the inability to maintain normal weight would lead the examining physician to recommend an x-ray examination of the chest for diagnosis. Certain types of early cancer might also be discovered. When such a discovery is made, appropriate treatment can be given with a good chance for complete cure, whereas cancer in an advanced state, as we know, is not nearly so amenable to treatment.

I recently heard of a woman in her forties who, in the course of a routine physical examination was found to have a small ulcerated area. It was smaller than a dime. A small specimen was taken from the region and was found to be suspicious of early cancer. She is having well planned treatment and her chances of getting complete relief are almost 100 per cent. A number of other conditions that might be uncovered are high blood pressure, certain types of heart disease, chronic Bright's disease and diabetes. Complete cures for some of these maladies are not known, but in some conditions such

as diabetes, the physician can prescribe treatment that will make a long and useful life possible when neglect of the disease would be disastrous. In certain other diseases, modification of one's mode of life, especially with regard to work, diet, exercise and rest, may be of the utmost importance.

One drawback might, I think, be mentioned. An examination that reveals no evidence of ill health may sometimes create a false sense of security. It must be remembered that the physician is not an omniscient being and that some diseases have an insidious beginning, sometimes existing in an early stage without presenting symptoms or signs, and not being apparent even after the most painstaking examination.

Why, then, do we advise these examinations? I think that a question of this nature can be answered best by summing up the points that I have previously tried to make. First of all, I think that we all ought to have a complete examination early in adult life to determine whether or not we have any physical defects or whether we have the early signs of disease. We ought to have such basic information so that we can correct any defects that are amenable to treatment. If we are found to have some condition for which there is no complete cure, we can then, at least, have competent advice in the regulation of our daily lives. Secondly, we should, each one of us, establish a relation with a doctor whom we choose as our physician and medical adviser and whom we can consult subsequently either because of illness or for advice about many of the knotty problems that are bound to vex us from time to time. It is far better to turn to an intelligent physician who has some common sense and both feet on the ground than to take our medical advice from well-meaning neighbors, faddists and cultists.

In conclusion, may I re-emphasize my belief in the importance of having a personal or family physician? Let him give you a thorough examination. Let him see you from time to time. Once a year is not too often. Get your advice about health problems from him. Let him, in what ways he can, help you to keep well, and in time of illness, call on him.

DEATHS

GILMAN—BERNARD B. GILMAN, M.D., of Boston, died May 31. He was in his thirty-eighth year.

He attended Harvard College and received his degree from Harvard Medical School in 1929. Dr. Gilman was assistant director of the division of communicable diseases of the Massachusetts Department of Public Health. In 1938 he received the degree of master of public health at Harvard.

He was a member of the Massachusetts Medical Society and the American Medical Association.

His widow, two sisters and five brothers survive him.

HAIGIS—PETER J. HAIGIS, M.D., of Foxboro, died June 2. He was in his sixty-ninth year. Dr. Haigis received his degree from Boston University School of Medicine in 1904. He was a member of the Massachusetts Medical Society and the American Medical Association.

CORRESPONDENCE

DEPRIVATION OF LICENSE

To the Editor: The license of Dr. James B. Ryan, 53 Maple Street, Easthampton, Massachusetts, was revoked

by the Board of Registration in Medicine on May 29 because of deceit in the writing of prescriptions for narcotic drugs.

STEPHEN RUSHMORE, M.D., *Secretary*
Board of Registration in Medicine

State House
Boston

REPORTS OF MEETINGS

HARVARD MEDICAL SOCIETY

There was a regular meeting of the Harvard Medical Society on March 11, with Dr. Elliott C. Cutler presiding. The first case was that of a forty-nine-year-old man who had had, over a period of seven weeks, a gradual onset of painless jaundice, with anorexia but no nausea or vomiting. There had been fleeting right upper-quadrant pain on one occasion three weeks previously. The stools had been light in color, and there had been periodic dark urine. Physical examination revealed marked jaundice, weight loss and an enlarged nontender liver. The chief positive laboratory findings were an elevated icteric index and cholesterol, and clay-colored stools, which were strongly guaiac positive. The prothrombin time was increased, and a gastrointestinal series revealed a filling defect of the duodenum. The patient was started on a regimen of parenteral glucose and vitamin K, but developed a sudden fever on the second day, with a positive pneumococcus blood culture. Treatment with sulfathiazole reduced the fever and the number of colonies on blood culture, but there was still evidence of a bleeding tendency, and blood transfusion and vitamin K were undertaken to return the red-cell count and prothrombin level to normal. Dr. Soma Weiss suggested that the case was probably one of primary neoplasm of the head of the pancreas. Dr. Samuel A. Levine commented that the early detection and intensive treatment of pneumonia may prevent the onset of the characteristic pulmonary manifestations of the disease.

The second case was that of a seventy-two-year-old man who for two or three years had experienced indigestion, gaseous eructations and an idiosyncrasy to fried and fatty foods, all of which were relieved by a proper diet. For the previous six months, there had been an exaggeration of all symptoms, with severe right upper-quadrant pain, nausea and vomiting. Physical examination revealed a dehydrated, questionably jaundiced elderly man, with a large tender right upper-quadrant mass, a leukocytosis of 21,000, an icteric index of 18, a negative diastase test and a slightly increased prothrombin time. On conservative treatment, the abdominal mass diminished in size. A gastrointestinal series was essentially negative, a cholecystogram revealed a nonfunctioning organ, and there was bile in the urine, an increased urobilinogen and occult blood in the stools. The patient was given 10 mg. of vitamin K preoperatively, and when cholecystectomy was carried out, small stones were found in all the ducts.

The speaker of the evening was Dr. Israel S. Ravdin, who discussed "Some Aspects of the Physiology of the Liver and Biliary Passages." Dr. Ravdin compared the liver function to that of a food commissariat. For carbohydrates this organ is the place of synthesis and storage of glycogen, which is the sole source of metabolized glucose. Most of the liver-function tests based on carbohydrate metabolism have been found unsatisfactory either because they remain normal until there is a large percentage of damage (as in the glucose-tolerance test) or because they add nothing to the clinical diagnosis (as

in the galactose test) The protein functions of deamination and the synthesis of serum protein, fibrinogen and prothrombin are now assuming greater importance. There can be as high as 90 per cent destruction of liver tissue, with maintenance of normal deamination. The liver is the largest store of bile protein, and probably the entire source of plasma protein. A decrease in the body protein is evidence of hepatic insufficiency, except in the presence of anemia and nephritis. The liver is the sole source of fibrinogen, which is decreased only in late toxic processes. For the synthesis of prothrombin, the presence of bile salts in the gastrointestinal tract is necessary for the absorption of vitamin K.

The bile metabolism is the most sensitive mechanism but offers technical difficulties in its tests. The liver is involved in the synthesis of bile salts, the formation of cholesterol in the bile and the manufacture of bile pigments. A diminution of bile salts in the gastrointestinal tract may easily cause symptoms through impairment of its functions in the emulsification of fats, the activation of lipase, the increased motility of the intestine, and the increased absorption of the fat soluble vitamins. Pigment probably comes largely from the blood, and the site of synthesis is more probably in the reticuloendothelial system of the liver and spleen than in the bone marrow. Dr Ravdin suggested at this point that a ten day study of stool specimens for urobilin may be a means of differentiating carcinoma of the head of the pancreas from an obstructing stone, for in the latter this substance will be found in at least some of the samples.

The detoxifying function of the liver has been used in the hippuric acid test to measure hepatic competence, but a normal test may be found with liver destruction of 70 per cent. Among the excretory functions are those associated with the bile pigments and other dyes. The bromsulfalein test is the most sensitive test of excretion. It was concluded that a combination of all these indices offers a clue to the liver function, which may or may not be substantiated by the subsequent course. In the treatment of increased prothrombin time, it was found that approximately 70 per cent of patients responded to both the natural and synthetic vitamins.

Studies on various types of bile indicate that normally the calcium, chloride and bicarbonate contents are similar to that of serum, whereas the cholesterol is not esterified. In the gall bladder, or storehouse, bile and esterified. In the gall bladder, or storehouse, bile salts are concentrated while the acid components are decreased. In gall bladder disease this concentration and decreased, respectively, are not maintained, although in severe affections there may be an actual increase of fluid and an inversion of the expected ionic relations. These in conditions offer a nidus for stones, for cholesterol is in equilibrium only when salts are present in proper amounts.

It was pointed out that in cholecystograms one should observe granules of opaque substance in the ascending colon to make certain that the gall bladder has had an opportunity to excrete the dye, for this is also excreted normally in the ascending colon.

As evidence that sensory stimuli from the gall bladder may simulate cardiac pain, three cases were cited of a proved interrelation of anginal symptoms with stimuli from the gall bladder region.

As the result of studies on the protection of the liver from toxic substances, the old concept of employing high carbohydrate and low fat diets has been supplanted. It was determined that the degree of hepatic injury is roughly proportional to the lipid content and that a high glycogen content offers no protection if this level is high

enough. An increased protein on the other hand, although it fails to prevent liver damage, does halve the amount of necrosis. It was found during the course of these experiments that a sterile fixation abscess produced with sodium ricinoleate prevents hepatic injury to any extent with any toxin. Oral protein does not have this effect because the circulating protective agents are formed only when the toxin is administered, instead of before that time. Any sterile abscess will have the same effect, the main problem being to rid the liver of fat at the expense of protein. In regard to the proper preoperative and postoperative management of biliary cases, it was pointed out that forced feeding, with emphasis on carbohydrates and vitamins is the best regimen for preserving glucose and diminishing lipids. Intravenous glucose is insufficient even for caloric requirements, and serves only temporarily to spare the protein stores of the body. The reappearance of the synthesis of bile salts following a common-duct operation may take many days, and bile feeding should be carried on during this entire period. If these salts remain low for more than twenty days, the patient will undoubtedly remain dyspeptic, owing to poor biliary function. It has been shown that the best protein for liver regeneration and protection is casein, whereas gelatin is the worst.

ALPHA OMEGA ALPHA

At a regular meeting of the Harvard Chapter of Alpha Omega Alpha on March 13 Dr Israel S. Ravdin gave a companion discussion on 'Preoperative and Postoperative Care of Patients with Biliary Tract Disease'. It was pointed out that the mortality entailed in such surgery is in large part due to ill advised or poorly administered preoperative and postoperative care. In considering the preoperative condition of the patient, one should remember that as little as 15 per cent of good liver tissue is adequate for normal values in most liver function tests, thus incipient incompetence may be overlooked, and a patient thrown into insufficiency by the relatively minor trauma of the operation and anesthesia. Moderate or even severe cardiac disease especially if demonstrable only by the electrocardiograph, should not be considered a contraindication to biliary tract surgery, if the local indications are clear, for it has been amply demonstrated that such operations may be followed by disappearance of certain pathological electrocardiograph findings.

The incidence of diabetes mellitus in chronic gall bladder patients is double that of the general population and may lead to easy hypoglycemic shock in such people under insulin treatment, for their liver glycogen store—a measure of function—is invariably lowered.

The hemorrhagic diathesis of obstructive jaundice is now known to be associated with a decreased prothrombin level, which is conditioned by poor absorption of vitamin K from the intestinal tract in the absence of bile salts. Certain patients—probably those with severe liver injury—are unresponsive to any form of vitamin K therapy, and this number of complete failures is about 18 per cent. 2-methyl-1, 4-naphthoquinone has been proved one hundred to one thousand times more potent in restoring the prothrombin time to normal than the naturally occurring vitamin K. The prevention of a hemorrhagic tendency lies in frequent prothrombin time determinations, the administration of vitamin K substrates with bile salts preoperatively and for ten to fourteen days postoperatively, and transfusions of blood high in prothrombin value, when other measures fail. It was emphasized that hemorrhages may still occur after jaundice has disappeared.

Another factor that may materially alter the mortality

is the decrease of liver damage by the choice of suitable anesthetics and the preoperative liver build-up. Probably any inhalation anesthesia causes some injury, and anoxia and chlorine derivatives produce the most damage. Therefore, the condition of the liver at the time of operation is the most important conditioning factor. It has been amply demonstrated that a liver high in available protein and low in lipid content affords the maximum protection against liver necrosis, if not damage. The deposition of liver glycogen is advantageous only if it displaces fat and protects the liver stores. Preoperative starvation tends to cause a high-lipid, low-protein content, and no amount of glycogen can protect a liver in which the fat content is above normal. Parenteral glucose alone cannot maintain adequate hepatic stores, and one should strive to force a high-protein, high-carbohydrate diet as soon as possible postoperatively. A diet consisting of 70 to 75 per cent carbohydrate, 20 to 25 per cent protein and less than 5 per cent fat offers the best conditions to combat damage and favor repair of the liver. The diets should be individualized for taste. Cottage cheese, with its high casein value, has been found an excellent food, and bananas have also been extensively used. Patients are given a 2600 to 4000 calorie diet a day and are actually forced to eat. Re-enforcement with plasma and intravenous fluids is helpful and sometimes necessary when patients are unable to retain food administered orally.

The only advice issued concerning the operative technique was to reveal accurately the vascular as well as the ductal systems, so that injury to or ligation of an anomalous hepatic artery, a procedure that inevitably results in death from liver insufficiency in experimental animals could be obviated.

Postoperatively, it is essential not to allow bile to be lost to the exterior in view of its important extrahepatic functions. Parenteral fluids cannot replace this loss. An attempt should be made to force it back into the duodenum by keeping the catch bottle at body level immediately after the operation, and then, by raising the bottle later, gradually to overcome the tonus. If this cannot be accomplished, bile should be fed. This can be done by collecting the bile when it begins to appear normal and then lyophilizing it.

The second important postoperative procedure is the early feeding of proper diets as described above. During regeneration, nucleoprotein is most important, and consequently the casein should be supplemented with large amounts of purines, especially liver. Finally, cholangiograms should be performed early so that immediate reoperation may be carried out in the event that a common-duct stone may be removed early, rather than caring for a stricture later. There may be enough residual liver damage in cases of long-standing disease so that there is temporary or even permanent decrease of gastrointestinal function as a result of decreased bile salts. When this diminution occurs, indigestion will remain after the gall-bladder colic has disappeared. In conclusion, Dr. Ravdin cited his mortality of 1.5 per cent in 604 cases for a ten-year period of all cases that were nonmalignant or not previously operated strictures. The decrease in mortality of comparable cases since the introduction of these newer preoperative and postoperative concepts was the most striking feature.

NOTICES

ANNOUNCEMENT

DR. HENRY L. CABITT announces the removal of his office from 475 Commonwealth Avenue, Boston, to 520 Beacon Street, Boston.

EXAMINATIONS FOR APPOINTMENTS IN THE MEDICAL CORPS OF THE UNITED STATES NAVY

Examinations for appointments as assistant surgeon (lieutenant, junior grade), United States Navy Medical Corps, will be held at all the large naval hospitals: the Navy Medical Center, Washington, D. C., on August 11 to 15, inclusive, October 6 to 9, inclusive, January 5 to 9, 1942, inclusive.

Applicants for appointment as assistant surgeon must be citizens of the United States, more than twenty but less than thirty-two years of age at the time of acceptance of appointment, and graduates of Class A medical schools who have completed at least one year of intern training in a hospital approved by the Council on Medical Education and Hospitals of the American Medical Association.

Examinations for appointment as acting assistant surgeon for intern training in naval hospitals accredited for intern training by the Council on Medical Education and Hospitals of the American Medical Association will be held on June 23 to 26, inclusive, October 6 to 9, inclusive, and January 5 to 9, 1942, inclusive. Applicant for appointment as acting assistant surgeon for intern training must be citizens of the United States, more than twenty-one but less than thirty-two years of age, and men of the junior or senior classes in Class A medical schools. After twelve months of intern training, acting assistant surgeons may apply for appointment as assistant surgeon in the United States Navy.

A circular of information regarding these examinations, physical requirements, rates of pay and promotion and retirement data may be obtained from the Bureau of Medicine and Surgery, Navy Department, Washington, D. C., on request. Applications for authorization to take the examination must be received at the Bureau of Medicine and Surgery three weeks before the examination.

Medical officers of the United States Navy are encouraged to develop a specialty, and are assigned, if their interest in the specialty warrants such action, to postgraduate instruction in the large naval hospitals, the Navy Medical Center, Washington, D. C., and civilian medical centers. Some of the specialties in which medical officers may seek qualifications are: surgery, medicine, ophthalmology, otolaryngology, roentgenology, laboratory, pathology, public health, psychiatry, deep-sea diving, aviation medicine (flight surgery), gas warfare, tropical medicine, medical research and so forth.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, JUNE 15

MONDAY, JUNE 16

12:15-1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.

TUESDAY, JUNE 17

12:15-1:15 p.m. Clinicoroentgenologic conference. Peter Bent Brigham Hospital amphitheater.

WEDNESDAY, JUNE 18

*12 m. Clinicopathological conference. Children's Hospital.

*Open to the medical profession.

JUNE 16-JULY 25 — Massachusetts Institute of Technology. Page 996, issue of June 5.

JUNE 22-24 — Maine Medical Association. Marshall House, York Harbor, Maine.

SEPTEMBER 1-5 — American Congress of Physical Therapy. Page 1000, issue of June 5.

5 PEMBER 1-5—American Occupational Therapy Association The May
 lower Washington D C
 October 13-24—1941 Graduate 1 night of the New York Academy of
 Medicine Page 834 issue of May 8
 October 14-17—American Public Health Association Page 59 issue of
 May 8
 April 20-24 1942—American College of Physicians Page 996 issue of
 June 5

BOOK REVIEWS

Controlled Fertility. An evaluation of clinic service By
 Regine K. Sax, M.D., and Frank W. Notestein, Ph.D. 8",
 cloth 201 pp., with 56 tables and 16 illustrations. Balti-
 more: William and Wilkins Company, 1940 \$3.00

This is the most important, original study of clinical
 contraception ever made in this or any other language.
 Dr. Sax, a physician on the research staff of the Milbank
 Memorial Fund, started to follow up a thousand women
 who had visited the Sanger Bureau from the Bronx in
 1931 and the first half of 1932. She located 991 patients
 interviewed them personally and secured a detailed and
 complete history. After a description of the group stud-
 ied and a consideration of the representativeness and ac-
 curacy of the data, the authors lunched it once into the
 reproductive experience of the group prior to clinic at-
 tendance. It has long been suspected by competent stu-
 dents of contraception that the early estimates by some
 clinic physicians of the reliability of contraceptives in
 preclinical use were worthless. Here it is shown that such
 "untutored" or "folk" practices are extraordinarily re-
 liable varying in effectiveness from 86 (condoms) to
 61 (douches) per cent. It is interesting that after patients
 abandoned the clinic method for one more acceptable to
 their individual needs, they practiced their habitual forms
 more effectively than prior to the clinic visit.

More than 40 per cent of the couples started practicing
 contraception immediately after marriage. After the first
 pregnancy the proportion doubled, and continued to in-
 crease as the duration of marriage lengthened. Couples
 more recently married took up contraception sooner than
 older couples. White collar workers used folk contra-
 ceptives much more effectively than laborers. Had the
 average couple not restricted family size in the nine
 years of married life preceding the first clinic contact,
 the wife would have had five pregnancies. Since al-
 most all couples used some method relatively early, the
 effectiveness was such that the average number of pre-
 clinical pregnancies per woman was only three. Only
 70 per cent of the pregnancies resulted in live births. 20
 per cent of the women were illegally aborted.

It has been demonstrated several times before that as
 pregnancies increase the risk of induced abortion is
 greater. Here there is confirmation of the fact. The
 rate for first pregnancies was 5 per cent, for pregnancies
 after the fifth, 50 per cent. Almost 40 per cent of the
 patients had accidental pregnancies in the two years im-
 mediately preceding their initial clinic contact. This
 was one of the circumstances that brought them to the
 clinic. They not only wanted a more reliable method but
 one that would permit more satisfactory social relations.

Most of the women who discontinued the clinic prescrip-
 tion did so within a month. At the end of that time only
 69 per cent were still using the clinic's prescription ex-
 clusively and regularly. Another 15 per cent were using
 it in part or alternating it with a habitual method. By
 the fifteen months slightly over a third were using the clin-
 ic's method exclusively and less than one half were using
 any part of it.

The high effectiveness of the clinic prescription is dem-

onstrated by the fact that there were only 9 pregnancies
 in each 100 years of exposure for the whole group. But
 it is a new finding of this book that the rates of effec-
 tiveness of variations of the clinic method 'did not differ
 significantly from those for the continuous and exclusive
 use of the prescribed contraceptives. Pregnancy rates
 with each kind of contraceptive after the patients at-
 tended the clinic were only half as high as the rates for
 the same devices prior to clinical attendance.

There are many practical tips in this book for the busy
 practitioner who has to deal with contraception. One is
 that it is much more important to induce a patient to
 adopt a method that will be continuously used than to
 urge the vaginal diaphragm and jelly on those who pre-
 fer another method. In other words, the absolute effec-
 tiveness of the method is less important than its acceptabil-
 ity to the patient.

The chapter 'Birth Control and Population Trends,'
 is brilliant and on the whole, sound. There might be
 differences of opinion among experts with reference to the
 interpretation of certain details, but the broad outlines of
 the position there taken are certainly well founded.

The fifty six tables and sixteen illustrations in this book
 assist materially in telling its story.

*The Extra Ocular Muscles. A clinical study of normal
 and abnormal ocular motility* By Luther C. Peter, M.D.,
 Sc.D. LL.D. Third edition, thoroughly revised 8",
 cloth, 368 pp. with 147 illustrations and 5 color plates.
 Philadelphia: Lea and Febiger 1941 \$4.50

The third edition of *The Extra Ocular Muscles* is ar-
 ranged in six parts dealing respectively with anatomy and
 physiology, heterophoria, concomitant squint, paralytic
 squint, nystagmus and surgical technique. Important ad-
 ditions have been made to Parts III, IV, V and VI.

In Part III which deals with concomitant squint, the
 author stresses the importance of the earliest application
 of measures to combat amblyopia, to correct anisometropia
 and aniseikonia, and to assist by orthoptic training in the
 development of the fusion faculty and he reviews the
 indications for surgery on the eye muscles.

In Part IV dealing with paralytic squint, a valuable
 section is devoted to a discussion of palsies of supranuclear
 origin.

Part V written by the author in collaboration with
 Dr. Joseph C. Yaskin professor of neurology at the
 Graduate School of the University of Pennsylvania, ana-
 lyzes clearly the ocular vestibular, and neurologic origins
 of nystagmus and suggests the value of using the ocular
 micrometer in the corneal microscope and slit lamp for
 the careful study of the character and amplitude of
 nystagmus.

In Part VI, dealing with surgical technique, the author
 frankly appraises the value of surgical procedures, and
 adds his comments about ptosis operations, and his meth-
 od of resection of ocular muscles to expedite surgery for
 retinal detachment and for exploration of the orbit in
 cases of neoplasms.

Blood Pressure Study 1939 4", cloth 69 pp. New York,
 compiled and published by The Actuarial Society of
 America and The Association of Life Insurance Medical
 Directors 1940 \$4.00

This volume consists almost entirely of mortality ta-
 bles based on nearly 50,000 deaths corresponding to
 about 1,309,000 life insurance policies. Of greatest inter-
 est are those showing the ratio of actual to expected deaths
 from various causes. Tables G to M show that the higher

a man's blood pressure at the time he takes out life insurance the greater are his chances of subsequent death at any given age from cardiovascular renal disease, cirrhosis of the liver, cancer, pneumonia or tuberculosis. The likelihood of his committing suicide, however, is progressively less the higher his blood pressure when he paid his first premium (Table N). Does this mean anything, and if so, what?

Properly understood and evaluated, life-insurance mortality studies are of very great value. Those who compile them would be quick to agree, however, that the process of drawing clinical conclusions from them is full of pitfalls for the unwary. Long ago, a comparison of European insurance mortality figures with those collected by American companies indicated that American men lived much longer than European men. Although this may have been due in part to the salubrity of our climate and form of government, Emory McClintock pointed out that one potent cause of the great difference was that, whereas European offices generally awaited applications, which are commonly prompted by some sense of need for insurance, the custom of American companies was (and is) "actively to solicit business through agents." On the average, he said, men who are induced only by persuasion to insure their lives are better risks than those who voluntarily apply.

There are many other factors to be considered in the evaluation of insurance mortality figures besides the effect of selection of risks. In the present connection, for example, one might raise the question of the validity of causes of death derived from death certificates, or the extent to which the transient blood-pressure level may be treated as a statistical character.

Nevertheless, much valuable information is contained in the archives of insurance companies, and all analyses of the available material are welcome.

Treatment in General Practice: Surgery. Articles republished from the *British Medical Journal*. Vol. IV. 8°, cloth, 562 pp., with 143 illustrations. London: H. K. Lewis and Company, Limited, 1940. 16s net.

The *British Medical Journal* has published a number of articles on treatment, part of which are incorporated in this fourth volume of a series. It deals with surgery in general practice and reviews the latest treatment in some of the commoner surgical affections. A large section of this book is devoted to fractures and traumatic surgery. There are other chapters on such varied subjects as pruritus ani and prostatectomy.

The principal features of this book are a simplicity and clarity of presentation and a minimum of detail. It is designed to instruct the busy practitioner who can read only a chapter or a paragraph between patients. The material offers nothing startling or new in therapy, but is more in the nature of a review of accepted practice.

For the American practitioner, some of the specific remedies will be difficult to understand, because of the proprietary names used in their designation.

Diagnosis and Treatment of Arthritis and Allied Disorders. By H. M. Margolis, M.D. 8°, cloth, 551 pp., with 140 illustrations. New York: Paul B. Hoeber, Incorporated, 1940. \$7.50.

This volume, written primarily for the family physician, attempts to present, in a concise manner, present-day knowledge of rheumatic diseases. The author has accomplished this as well as had been done in any volume on arthritis yet published. The arrangement is logical, and the pictures are good and well chosen. For

those who wish a fuller discussion, there is an adequate list of references. The book is well written.

It is unfortunate, however, that the men who write about arthritis consider it necessary to discuss all the related conditions that appear in the joints. In this book, two fifths of the pages are taken up with a discussion of orthopedic conditions that should have been left to treatises on orthopedic surgery. The book should be a helpful one for the busy family physician who is called on particularly for the early treatment of patients suffering from rheumatic diseases.

The Endocrine Glands. By Max A. Goldzieher, M.D. 8°, cloth, 916 pp., with 271 illustrations. New York: D. Appleton-Century Company, Incorporated, 1939. \$10.00.

For one person to write a textbook of endocrinology is to attempt what is almost impossible; the author has made this attempt, but rather unsuccessfully, according to the opinion of the reviewer. Side by side with much material that has been handed down from one textbook to another appear quite up-to-date conceptions of the pathogenesis of certain disorders; it is too bad that many concepts which have not been scientifically substantiated through the passage of years have been allowed to remain. Very often cases referred to in the text are found on careful study not to illustrate the citation. With all these criticisms, it must be said that the prefacing paragraphs on embryology and physiology of the gland under discussion are excellent; in the bibliography, there seems to be an excellent introduction to the German literature, with which the author is undoubtedly very familiar.

Vitamin Therapy in General Practice. By Edgar S. Gordon, M.D., and Elmer L. Sevringhaus, M.D. 8°, cloth, 258 pp., with 35 illustrations. Chicago: Year Book Publishers, Incorporated, 1940. \$3.25.

This book presents to the clinician in a concise manner the information he needs to understand nutritional requirements and deficiencies. The vitamins are presented as a specific chemical compound playing particular roles in cellular physiology. The reader will realize that vitamins no longer are mysterious, unknown substances that can be measured only in terms of some arbitrary unit related to their biologic activity in some convenient experimental animal. As known chemical compounds, their requirements and therapeutic doses may now be designated simply in terms of milligrams. The clinician should be the first to welcome and utilize this simplification, which has been made possible by advancing knowledge.

The chapters on minerals, proteins, carbohydrates and fats present much that will refresh and supplement the clinician's knowledge. The discussion concerning low-carbohydrate versus high-carbohydrate diets in diabetes mellitus is both sound and needed. The chapter on weight control places the desired emphasis on dietary factors and control at a time when endocrine factors and therapy are so often stressed.

One regrets that the high standard of up-to-date knowledge set throughout most of the book is injured by such statements as: that a plasma ascorbic acid concentration of "from 1.0 to 0.5 mg. per cent may be considered as borderline and below 0.5 mg. a definite deficiency may be assumed to exist"; or that calcium lactate and gluconate are better sources of bone and tooth salts than calcium phosphate. And one regrets also that the high standard of accurate information is marred by an unsubstantiated

claim concerning the efficacy of vitamin P in purpura and by the statements that the characteristic laboratory finding during active rickets is primarily a fall in 'blood calcium level' and that the phosphorus in the blood also falls, but usually does not go below 25 to 30 mg per cent.

In spite of these rare flaws, the reader will both enjoy and profit by reading this book. And, if in reading the last chapter he is shaken from his complacent belief that this nation is well fed, his reading may be of much benefit to many.

A Pioneer Doctor in Old Japan The story of John C. Berry M.D. By Katherine Fiske Berry 8°, cloth, 247 pp., with 20 illustrations. New York: Fleming H. Revell Company, 1940. \$2.50.

Dr. Berry was born in Maine, on the Kennebec River in 1847. He studied medicine at Bowdoin College and took an eighteen month internship at the United States Marine Hospital in Portland. He then entered the Jefferson Medical College in Philadelphia, where he graduated with honor in 1871. After a few months of practice, he went to Japan with a mission for the American Board of Foreign Missions of Boston. He crossed the Pacific in a side wheeler, with the girl he had recently married, and started to work in Kobe, as a successor to another American physician, Dr. James C. Hepburn who had written the first Japanese English dictionary.

This book tells of Dr. Berry's long service in Japan. The latter part of his life was spent in Worcester, where he practiced as an otolaryngologist, until his eighty-eighth year. This charming biography is written by his daughter. In it will be found an exceptional picture of Japan and the splendid medical work done by missionaries such as Dr. Berry. Japan will not soon forget the life of this extraordinary person, and Americans may well be proud of a compatriot who did so much for a foreign country.

History of Pharmacy A guide and a survey By Edward Kremers, Ph.D., Ph.M., Ph.D., Sc.D., and George Urdang, Ph.D. D.Sc. Nat. 8°, cloth, 466 pp., with 30 illustrations. Philadelphia: J. B. Lippincott Company, 1940. \$4.50.

The work is divided into three parts, the third of which, having to do with pharmacy in the United States, is the first comprehensive treatment of that particular period in pharmacy. The first two parts, comprising 108 pages, deal with the early history of pharmacy and the rise of professional pharmacy in the various countries of Europe.

The book is written from the viewpoint of teaching, and for this reason the work has been kept within a comparatively small number of pages. The various supplements add to the value of the book, and the bibliography of thirty pages documents the authors' statements.

Modern Drug Encyclopedia and Therapeutic Guide By Jacob Gutman, M.D. Ph.D. Second edition 8°, cloth 1644 pp. New York: New Modern Drugs, 1941. \$7.00.

This encyclopedia is arranged on the same plan as the *Pharmacopoeia of the United States*. It presents the descriptions of 11,114 modern ethical medicinal preparations in 15,629 forms, all of which are not in the *pharmacopoeia*. It has two comprehensive indices, one of drugs and general matters and the other a therapeutic index.

This book should be valuable to those concerned with proprietary drugs and medicinal preparations.

Progress in Medicine A critical review of the last hundred years By Igo Galdston, M.D. With a foreword by Henry E. Sigerist, M.D. 8°, cloth, 361 pp. New York: Alfred A. Knopf, 1940. \$3.00.

The author offers to students of science and the history of medicine an instructive and challenging account of the last hundred years of progress in medicine. It should be noted that he not only presents conclusions that have crystallized out of the controversies of other times, but also gives careful consideration to living issues. After carefully reading this book, students will come to see that many facts that the labors of earlier generations brought to light were at best provisional, and that this historical lesson is vitally applicable in modern times. The discussion is presented in clear, terse style and with a scholarly regard to historical perspective. A chapter, 'The Genius of Pasteur', is preceded by 'The Preludes to Pasteur' and followed by 'The Pasteurians'. Then follow chapters entitled 'The Reign of the Microbes', 'The Challenge of Nutrition', 'The Inner Realm and the Endocrines', 'From Mesmer to Freud', 'Freud and Modern Psychiatry', 'A Century of Clinical Progress' and 'Whither Medicine?'. This adroitly handled account of medicine during the last hundred years is strongly recommended for careful study to undergraduates and to graduates in science.

Complete Guide for the Deafened By A. F. Niemoeller, A.B. M.A., B.S. With a foreword by Harold Hays, M.D. 8°, cloth, 156 pp. New York: Harvest House, 1940. \$3.00.

This book is well written and in a language that the lay person can understand. It describes the causes of deafness and the relation of various diseases to deafness. It also discusses the effects of explosive sounds and operations of the ear on hearing. There are good sections on hearing tests, the use of the audiometer and the methods of retraining the deaf. The book should be of great value to the otologist, since it gives the viewpoint of the deafened person and also outlines the proper psychological approach to be used with the deaf person.

Foreign Bodies Left in the Abdomen The surgical problems cases treatment, prevention The legal problems cases decisions, responsibilities By Harry Sturgeon Crossen, M.D., and David Frederic Crossen, LL.B. 4°, cloth, 762 pp., with 212 illustrations, including 4 color plates. St. Louis: The C. V. Mosby Company, 1940. \$10.00.

The authors have put a great deal of painstaking effort into the writing of this book. It is a medicolegal exposition on the problems of foreign bodies left in the body at the time of operation, and is written by a surgeon and a lawyer. It is more in the nature of an encyclopedia and reference book for the use of a person with such a problem in hand. The great detail of the case reports and of the individual experiences precludes a cover-to-cover reading simply for interest in the material presented.

The most valuable part of the volume to the practicing surgeon is that which considers prevention of these unfortunate accidents. Use of the continuous-strip instead of individual sponges is advocated as the safest method for packing away the abdominal contents. A chapter on ingested foreign bodies is interesting because it again calls attention to the amazing array of objects that the alimentary canal can expel spontaneously.

This book will find its greatest usefulness in the reference library for those who are called on to assist in the legal solution of these cases.

A Surgeon Explains to the Layman. By M. Benmosché, M.D. 8°, cloth, 317 pp., with 62 illustrations. New York: Simon and Schuster, 1940. \$3.00.

In this book the author has attempted to popularize the commoner surgical procedures. To the reviewer, it seems that the type of person who will read such a volume for self-education is the one who is intelligent enough to consult his physician for unexplained symptoms. In such cases, the physician can describe a specific disease for the patient better than any book. Other classes of patients are better reached through magazines, cinema and radio than through such a medium as this. They are the ones who will at best understand and follow such a simple rule as, "Don't take a laxative for pain in the abdomen; see a doctor first."

The reviewer believes that the author has made an effort to popularize a subject that does not lend itself well to such a purpose.

The 1940 Year Book for Industrial and Orthopedic Surgery. Edited by Charles F. Painter, M.D. 12°, cloth, 484 pp., with 299 illustrations. Chicago: The Year Book Publishers, Incorporated. 1940. \$3.00.

In this small book, the author has attempted to condense the worthwhile contributions in orthopedic surgery of the past year, and he has succeeded as well as possible with so large a task. The book is clearly and concisely written. The arrangement is commendable, and the subject matter is well outlined and indexed.

Unfortunately, what constitutes a contribution to orthopedic surgery and what amount of emphasis each topic should be given are matters on which each orthopedic surgeon differs. Tuberculosis receives more attention than its present-day importance seems to merit, and congenital and developmental deformities are given very brief notice. The section on fractures is one of the best in the book. The same thing might be said of the final chapter on industrial medicine.

The style is good, a rare thing in medical treatises of this generation. The book is interesting reading. It is an excellent compendium of present-day orthopedic practice and should prove helpful to all orthopedic and industrial surgeons.

Psychotherapy: Treatment that attempts to improve the condition of a human being by means of influences that are brought to bear upon his mind. By Lewellys F. Barker, M.D. 12°, cloth, 218 pp. New York: D. Appleton-Century Company, Incorporated, 1940. \$2.00.

Few men in America are so well qualified by virtue of wide medical experience to discuss psychotherapy as Dr. Barker. This book is ample proof that he has dealt with patients in various stages of mental disturbance for a long and profitable period.

Dr. Barker points out, soon after defining his understanding of the title, the importance of making comprehensive diagnostic studies on which adequate treatment can be based. He believes that a knowledge of the heredity and environment of a patient is of extreme importance in mapping a plan of specific treatment. The methods of mental therapy, such as suggestion and hypnosis, persuasion, rest and isolation, are capably reviewed before he discusses the more comprehensive treatments associated with the name of a single psychiatrist.

Psychoanalysis is considered not only as a psychological entity and technic but also as a historical landmark. The dependence of the "psychological analysis" of Janet, the "individual psychology" of Adler and the "analytical psychology" of Jung on the basic technic is extensively elaborated. The contributions of Stekel and Rank are reviewed.

Psychotherapy in the various ages of life (childhood, adolescence, adulthood, in later life and old age) forms a large part of the volume, but psychotherapy as it relates to the treatment of organic and functional disorders is not neglected. A chapter on the future of psychotherapy is inspiring and should be read by those physicians who believe that psychological treatment has reached a cul-de-sac beyond which no further application can be envisioned.

This book warrants the attention of physicians who do not specialize in psychiatry, and of medical students, social workers and persons who wish to obtain a broad view of the field or who wish a starting point for more intensive studies.

Fractures and Dislocations for Practitioners. By Edwin O. Geckeler, M.D. Second edition. 8°, cloth, 314 pp., with 267 illustrations. Baltimore: Williams and Wilkins Company, 1940. \$4.00.

The first edition of this book, published in 1937, had of necessity to be soon followed by a second, because so rapid a pace is being set by those who are interested in the treatment of injuries to bones. It is clearly written, well illustrated and full of practical suggestions concerning methods of treatment. The emphasis laid on after-care should be taken to heart, for more depends on it than some recognize. The modern operative approach to such cases as are better handled by open methods is well defined, and the technic is outlined.

This volume can be enthusiastically recommended to all who wish a concise statement of the essentials of the treatment of fractures and dislocations.

Taber's Cyclopedic Medical Dictionary. By Clarence Wilbur Taber. 12°, cloth, 1372 pp., with 273 illustrations. Philadelphia: F. A. Davis Company, 1940. \$2.50.

This small dictionary of 50,000 words is a new publication in the field of dictionaries and is not a revision of the author's digest of medical terms, which was published in 1937.

Of particular interest are the appendices, consisting of a glossary of Latin medical words, definitions of prefixes and suffixes and "the interpreter," which is a phrase book written in five languages and especially arranged for diagnosis.

Dizionario di medicina per medici e famiglie. By Dott. Giulio Casalini. F°, cloth. Vol. 1, 868 pp., with 1550 illustrations and 24 color plates; Vol. 2, 917 pp., with 1912 illustrations and 35 color plates. Torino, Italy: Corso Taffiello, 1939. Lire 300.

This well-illustrated dictionary is encyclopedic in character. There are 8000 subjects, ranging in size from a few lines to a number of pages, and illustrated with many figures and plates, some of which are in color.

The work is well printed on good paper and reflects the current aspect of Italian medicine. The dictionary was written for both physicians and the laity, and Dr. Casalini was assisted by a corps of twelve eminent Italian professors and doctors.

The New England Journal of Medicine

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VOLUME 224

JUNE 19, 1941

NUMBER 25

THE CARE OF THE HOSPITAL OUTPATIENT*

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PHILADELPHIA

I AM deeply appreciative of the honor that has been conferred on me by the opportunity to present this George Washington Gay Lecture on the Care of the Patient. I have accepted the invitation of your committee in a corresponding spirit of humility and with a full realization of my inability to contribute anything of importance to the masterful addresses on the art of individual medical practice already delivered in this series by Peabody, Thayer, Herrick and other distinguished clinicians. Their presentations were of such a fundamental nature and on such a broad human basis that they will stand permanently as guides in the art of medicine. Fortunately, however, Dr. Gay, being a person of wisdom and foresight, established his foundation for lectures on the economics as well as the ethics of medicine, and therefore undoubtedly anticipated a need for constant change in the organization of the profession for the provision of efficient and at the same time reasonably priced medical service. In any event, I am taking advantage of such an interpretation of his conception of the future of medicine to discuss some of the more recent developments in the care of the patient, especially with reference to its accomplishment by a group of practitioners rather than by an individual physician. This type of practice for the hospital inpatient has for a long time been well established, and, by referring more specifically to its employment in the care of the hospital outpatient, I wish to indicate its equal availability and some of the advantages of its more general use in other fields of medical endeavor.

No matter what form of practice may ultimately develop, however, let us not forget that the care of the individual patient always constitutes the primary function of the physician and that this implies more than the management of the disease from which the person suffers. Since the develop-

ment of disease depends on the reactions of a person to unfavorable conditions in life, its control, including its prevention, may involve not only a consideration of each patient's innate constitution, of his physical, mental and emotional equipment, of his personality, of his habits, of his social relations and of his contacts with the physical world, but also an appraisal of all the factors, internal and external, that tend to create for him an abnormal situation. Thus, whether it grows out of the science or the art of medicine or comes from some of the related sciences or arts, every recorded observation, every established fact, every technic and every human effort that contributes to the prevention, recognition or management of a diseased state in man may be regarded as in keeping with the fundamental aim of medicine.

The accomplishment of good care for the patient, therefore, requires not only a knowledge of disease itself and of the technics for its prevention and amelioration, but also an understanding of the person who has the disease and the skill with which to apply the effective therapeutic procedures. The established facts regarding disease and its treatment may be acquired from the observation of others, and it may be assumed that you, as Harvard students, have already learned many of these from your teachers, your textbooks and the current medical journals, but to understand people and to have the skill with which to apply your knowledge to the alleviation of their ills is a far more difficult matter and is never completely mastered.

The changes in the methods of practice that are now taking place have been attributed by some to a desire on the part of the Government to socialize every phase of life, to regiment all our activities and to limit our personal freedom, but, for medicine at least, the modern viewpoint can be explained on a far simpler and more rational basis. Not so long ago the family physician was presumably instructed in all the currently known

*A George W. Gay Lecture on the Care of the Patient delivered before the students of the Harvard Medical School January 9, 1941. From the Gastro-Intestinal Section (Kinsey-Thomas Foundation) of the Medical Clinic University of Pennsylvania Hospital.

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aspects of medicine; his patients were usually his neighbors and his intimate friends, he knew their heredity and their personal habits, and he was supposed to know, under most circumstances, what the profession had to offer for the relief of their ailments. Furthermore, when a particularly difficult clinical situation, diagnostic or therapeutic, arose he could only call in a colleague or consultant whose advice was based largely on personal experience with similar cases. No exact methods of diagnosis and no specific therapeutic procedures were available. With the development of surgery, and later of the specialties, with the great advances in the scientific knowledge of disease and especially with the development of the modern hospital, including its special facilities for diagnosis and treatment, it obviously became impossible for any one physician, no matter how well trained and equipped, to meet all the needs of some of his patients. Consultants, furthermore, instead of making a diagnosis or advising therapy on purely clinical observation of the case or on their general experience, began to demand exact scientific data, and patients themselves began to question the diagnosis and the forms of treatment that were not based on exact laboratory procedures.

It is readily admitted that in the great majority of cases the disease can be easily and satisfactorily diagnosed and managed by a competent practitioner. In fact, not only because it involves less time and expense but also for psychologic reasons, complete care by a single physician is often more effective. No system of practice, as a matter of fact, that requires useless professional activity or unnecessary procedures of any kind will serve the patient's or the public's best interest. And yet the problems of some patients are so complicated and the available means for attacking them are now so specialized that a group of physicians, many of them differently trained and equipped, must be called on to deal with the individual case. Their efforts, however, to be maximally effective must always be directed and co-ordinated by some single person, the personal adviser at least for the time being, so as to afford the patient a consistent program of intelligent care.

The importance of having at all times for each patient, no matter what the nature of his case, a competent physician responsible either for all the care that is demanded or at least for its administration by others is generally appreciated. Yet, in the process of the change that is now taking place in medical procedure, many patients have lost the kindly, continued medical supervision that constituted the chief advantage of the older system. Even in the wards of our hos-

pitals, where all the physicians concerned are closely associated, it sometimes happens that no one of them becomes the patient's personal adviser, co-ordinates the efforts that are made in his behalf and sees to it that his emotional as well as his physical problems receive their due share of attention. About this aspect of the matter Peabody spoke most emphatically in his Gay Lecture of 1927; it demands equal emphasis today. In private practice, except perhaps with the financially well-to-do, the situation is even more serious: because of the added expense or for fear of losing the patient, the practitioner may not seek the advice of qualified specialists, or, if he does so, may not be in a position to control the further management of the case. On the other hand, the specialists involved, because of a lack of personal contact with the referring physician or with each other, may be in ignorance of important aspects of the case other than their own. Finally, the patient himself, irrespective of his financial status, may choose his own specialist, often incorrectly, or may drift from one physician to another with no correlated supervision. In the end, he may put himself in the hands of a cultist or give up in despair.

At any rate, in spite of the improvement in medical facilities, the great mass of the population is not yet receiving the good medical care that the profession is capable of supplying. Statistics concerning the supply and distribution of physicians and the number of people within or beyond their reach in the country at large vary greatly, but are of little, if any, value, since they do not indicate the type of care that is available. The unfortunate situation is better shown by the number of patients who come to hospitals, even in the large cities, with an unrecognized and hopeless cancerous lesion, with a neglected and advanced pulmonary tuberculosis, with a ruptured appendix, with a long-standing intestinal obstruction or with a severe but preventable type of infection. Too often one finds that the family physician had failed to do a digital examination of the rectum, to palpate a breast, to make a careful clinical study of the chest or to do a blood count or a simple urinalysis. I do not want to be unfair to our profession, but we must face the situation, and admit either that many of our general practitioners are incompetent to render good medical care or that the present system of practice does not permit them to render the service of which they are capable.

One cannot entirely excuse the average practitioner for such a situation, or fail to take advantage of the opportunity to urge better training for him: and yet, before we place the chief blame on the

family physician, let us remember that far more is expected of him than in the past, that he too, to an extent, may be a specialist of some sort, that his small fees limit greatly his time for the individual patient, and that once in active practice, he often has little opportunity to keep abreast of the advances in medicine.

The hope for better care of the average patient, therefore, seems to lie largely in some reorganization of the system of practice, one that would make available to the practitioner all the facilities needed for the care of his patient and at the same time permit the physician to make a good living and to do his work leisurely and effectively.

Special types of highly organized medicine have developed in response to this situation: the elaborate medical departments of the United States Army and Navy, to meet the health needs of our active soldiers and sailors; the veterans' hospitals, to care for the physical handicaps of previously enlisted men; institutions, under governmental auspices, for the supervision of the insane and the tuberculous; industrial medical units, for the care of employees and sometimes of their families; finally, various associations of physicians for the conduct of private practice, sometimes under an insurance system.

Before discussing the hospital outpatient department as a further example of this type of practice, and one that is organized to function in cooperation with the general practitioner, it is worth while to consider the essentials of good medical care. I think they may be summarized as accurate diagnosis, the economical and efficient employment of all the established measures of therapy, and continuous personal supervision of the patient as an individual.

Surely accurate diagnosis is the first requirement. This involves, in many cases, much more than the securing of a detailed story of the patient's symptoms, of his past medical experiences and of his family and social relations; it includes more than a meticulous physical examination and the accomplishment of a few routine laboratory tests. Frequently it necessitates, at least for purposes of elimination, the services of specially trained professional and technical workers: chemists, bacteriologists, roentgenologists, ophthalmologists, urologists, gynecologists, otolaryngologists and, sometimes, general surgeons. It requires, furthermore, that the results of the studies of these specialists be assembled and analyzed, in the light of the primary clinical observations, by someone who is highly trained and experienced in the broader aspects of clinical medicine, by one who stands in the position of "physician" to the particular patient.

The second essential for good medical care is that all the necessary facilities for the treatment of the diagnosed condition be made available to the patient. This may involve nothing more than an assurance on the part of the original physician that no disease process has been discovered, and some advice about the patient's manner of living or the regulation of his diet; but it may require the services of another special group of professional and technical workers, such as surgeons, roentgenologists, psychiatrists and physiotherapists. It may necessitate the employment of elaborate physical equipment: a roentgen-ray machine, orthopedic apparatus, gymnasiums and so forth. It may, of course, demand hospitalization of the patient.

The third and equally important requirement is continuous personal supervision of the patient throughout the period of his study and of his treatment. On the success or failure of this phase of care, which involves primarily the art of medicine, rest to a large extent the degree of cooperation of the patient and the ultimate result of the therapeutic effort. So far as possible, the doctor originally consulted by the patient should assume the responsibility for his total management. In most cases he will be the family physician, the general practitioner or the internist, but whatever his type of work, if he is capable of carrying through this aspect of the patient's care, he may be regarded as a "physician." Although I fortunately have the privilege of knowing many specialists and surgeons who are excellent physicians, I know others, even internists, who function largely as specialists, in the narrow sense of that term, having no interest in the patient beyond the management of his disease, and in that only so far as it fits into their special fields of scientific effort. Such a person, no matter what his qualifications in a special line of work, cannot be looked on in the true sense of the word as a physician. Such a specialist, to supply all the essentials of medical care to his patient, must usually function in cooperation with another practitioner, one who can assume responsibility for the general management of the patient, one who will be his "physician."

Sometimes, for special diagnostic investigations, for therapy, for personal reasons of the patient or the doctor or for a new viewpoint regarding the case, it is necessary at least temporarily to transfer the patient from the supervision of one physician to that of another, as, for example, when hospitalization is required, when the immediate disease process lies outside the range of the first doctor's activity or when an assigned professional service in a clinic or hospital terminates. Under such cir-

cumstances the transfer of responsibility should be clearly understood by the patient as well as by the recipient physician. Only in this way can a continuity of personal supervisory service to the patient be maintained and his thorough cooperation secured. Furthermore, when the situation is so managed and the activities of the second physician have been completed, the patient ordinarily should return to his former physician and thereby maintain a more permanent relation with him. Such an arrangement not only makes for consistent care of the patient but at the same time establishes and maintains a cordial relation among physicians.

I shall now discuss the hospital outpatient and consider to what extent the organization that has been developed for his care meets the indications that I have outlined, and incidentally to what extent it has failed to do so.

From one point of view, at least, the outpatient has from the start a great advantage over the ordinary private patient: like the ward patient, he does not have to pay the costs of his medical care. He may be admitted to the hospital clinic on an entirely free basis, or, if able, he may pay something to the institution, but under no circumstances are the services limited by his economic status, and there is no financial relation between the doctor and the patient. This divorce of the monetary aspects of the care of the patient from its professional phases is significant not only for the patient, but also for the physician. It frees the former from the fear of jeopardizing his economic status, whatever it may be, or of incurring financial obligations that he cannot meet; it gives the latter free rein to devote to the patient and to demand of him whatever amount of time the case deserves, to seek such laboratory and professional aid as may be needed for diagnosis or treatment, and to establish a personal relation unhampered by any thought, on his part or that of the patient, of subsequent materialistic adjustment. Under such circumstances the professional and personal aspects of the doctor-patient relation take precedence over all others and create an ideal background for good medical care.

In this connection, it may be appropriate to say a word regarding the free choice of physician, about which there has recently arisen a great deal of controversy. The hospital outpatient has no opportunity to select his physician although in many institutions if he is dissatisfied with the one to whom he has been assigned he may, on request, be transferred to someone else in the same department. In my experience such a request has rarely been made. The average patient comes or is sent by his family doctor to an institution because of its

reputation in the community, and, so long as he is receiving what I have defined as good medical care, he is co-operative, quickly develops a sense of loyalty to his physician and expects no variations from the routine of the organization except as indicated by his professional needs. It is to be assumed, however, that at each visit for a reasonable period the patient sees the same physician, as he would if consulting a private practitioner, and that, in consequence, no confusion about the continuous personal management of his case develops.

Since I have defined accurate diagnosis as the first essential in good medical care, I shall now review the opportunities for exhaustive study of the patient in the outpatient department of a general hospital. The entire facilities of the hospital, so far as they can be utilized for an ambulatory patient, may be made available. This includes not only the physical apparatus, such as the roentgen-ray equipment and the laboratories, but also the entire personnel of the hospital, professional and technical. From the viewpoint of the hospital's service to its community, the outpatient department may become, perhaps is already, of even greater importance than the ward. A larger number of patients can be cared for, in most instances they are in the earlier stages of their disease and they can oftener be cured and again made useful citizens. In addition, many of the patients, except for the outpatient service, would eventually become ward cases and so require the additional expense incident to lodging and board. Furthermore, many outpatients, even while under observation, may continue their employment, and consequently at the same time be productive citizens, supporting themselves and their families. It behooves the hospital, therefore, as a public institution, to contribute to outpatients all its available resources for diagnosis and for treatment.

In some institutions only the younger and less seasoned clinicians do the outpatient work, but from the viewpoint of their service to the community the more experienced staff members, if only in an administrative or consultant capacity, might be of greater value in the dispensary than they are in the ward.

In any event, a well-organized outpatient department, co-operating freely with similar units in a general hospital and having the entire physical and personnel facilities of the institution at its disposal, is ideally equipped to afford accurate diagnosis for its patients.

As to the second essential for good medical care, that of treatment, little more need be said. If the facilities for diagnosis are available, so also

are those for treatment. This may sometimes involve the necessity for hospitalization, but it is astonishing to what extent the development of efficient outpatient departments, in addition to the advance in methods of therapy, has diminished the reference of certain patients to hospital wards. In my intern days, our wards were filled with patients of a type that are now equally or better cared for on an ambulatory basis, especially those with pernicious anemia, diabetes, peptic ulcer and gall-bladder disease, and some with cardiac, renal and pulmonary disease. Now such patients rarely need be admitted to a hospital for diagnosis, and for treatment only when the disease is well advanced or refractory or demands prolonged bed rest or surgery. From a gastrointestinal clinic I find that, although we still refer many patients to the surgical wards, only rarely is it necessary to hospitalize them for diagnosis or even for medical treatment.

The chief difficulty in the outpatient department concerns the third essential for good medical care: continuous personal supervision of the patient. This, however, is because we have not always given proper consideration to the art of medicine in our outpatient services. Owing to the number of patients, the relatively brief period available for each one, the physician's desire to see as many of them as possible, his primary interest in the abnormalities that they present or a feeling that they are "only outpatients," the human side of their problems has been neglected. Sometimes perhaps we have been too ready to pass them on to some other department for a tonsillectomy, a tooth extraction, a gynecologic examination or some other diagnostic study, or for some form of treatment by a specialist. There the patient's association with the hospital may have ended, or he may have been sent on to another clinic, no one taking the trouble to act as his "physician."

Outpatients, however, are just as human as private ones, and although usually more easily controlled, they require an equal consideration of their personal problems. Often they go to the hospital after considerable hesitation about doing so, but they usually go because they want help, and they are keenly appreciative of any manifestation of interest and sympathy. The greater the intellectual gap between them and their physician the easier it is to establish an emotional relation: one of friendship, of loyalty, of understanding and of an obvious desire to help. To such an attitude on the part of the physician, the average outpatient readily responds with the utmost co-operation. Furthermore, it rarely requires any extra time to

develop such a personal relation, for it is largely a matter of the physician's manner and of his consideration of the patient's personal as well as of his specific medical problems. The interest must be maintained, however, and must extend to the patient's management so long as he is under the physician's observation.

Some such relation with the patient should also be manifested by all those with whom he is associated. The admission clerk, the secretary, the nurse, the social-service worker, the laboratory technician, as well as the physician, should constantly maintain toward him an attitude of friendliness and of personal concern for his welfare. Any one of these, by an injudicious remark, a display of temper, an indication of prejudice, a sign of preference for one patient over another or an unkind act of any sort, may so disturb the patient as to undo the best efforts on the part of the others. On the other hand, some one of the group—oftenest a secretary, a nurse, a social-service worker or an officially designated hostess—may so impress the patient with her interest in his case and her personal desire to help him, that she may greatly simplify the duties of the physician in this regard. Ideally, if a person with such qualifications is available on the staff of a clinic, her other duties should be subordinated to this most important one. She should welcome the patient to the department, even before he meets his clinic physician, should see him again before he leaves and should discuss with him subsequent visits, detailed arrangements for consultations with other physicians of the hospital, for laboratory procedures and for hospitalization. She should also be the one to accompany him to other departments of the hospital, to visit him in the wards and often to lend moral support when an important decision—for example, regarding an operation—is to be made. In some cases she should be with him when he goes to the operating room. In such a way a single member of the staff, not necessarily and perhaps preferably not a physician, may give continuity to a patient's care and at the same time greatly relieve the professional staff.

Finally it becomes necessary to consider the ultimate disposition of the outpatient. If he has been referred by a family physician, whether merely for diagnosis or for diagnosis and treatment, the matter is not difficult. When the diagnostic studies have been completed or the indicated treatment has been given, the patient is referred back to that physician and the latter is informed, preferably in writing, of what has been accomplished. The patient is then again in the hands of his original physician, and presumably he will continue to

consult him from time to time as the occasion demands.

For the unreferral patient, however, who is usually indigent, the matter is more difficult. The hospital's duty to him is not ended until his disease is cured, or at least until his physical condition is stationary and requires no further professional observation. If he develops a subsequent illness that demands only ambulatory supervision, he will presumably return to the same hospital for reference to the proper clinic. If, however, he develops a disease that requires home care, few clinics or dispensaries are able to handle the situation. Boston, however, is fortunate in this respect, having the Boston Dispensary, the obstetric service of the Boston Lying-in Hospital and the pediatric service of the Boston Floating Hospital, all of which supply home care. Ordinarily the former outpatient, when a new illness develops and he cannot return to the clinic, calls in a local physician, whether or not he is able to pay for such special service, or he goes without medical supervision. When the physician knows that he cannot be paid, which happens with most former outpatients, it is unfair to expect him always to render what I have defined as good care; when the patient does not seek medical advice, he may not only endanger his own life but also become a menace to his family and his community. The care of the indigent is not, therefore, as yet completely solved, even by most hospital outpatient departments.

Thus even in the large cities, where the hospitals are well staffed and equipped and the outpatient services are well organized, some of the problems of the patient who cannot afford to pay for medical attention remain unsolved. How much more acute must this problem be in the small cities and the rural communities, in some of which no hospital exists, or at least none with provisions for the complete study and treatment of the ambulatory patient. His medical care, under such circumstances, depends not on the community at large but on the charity of the local medical profession.

One is led, therefore, on the basis of these considerations of hospital outpatient service, to speculate on the extent to which the principles that I have discussed may be applied to the supervision of the private patient of moderate means. He does not expect, nor is it desirable from his or a public viewpoint, that his medical services should be secured on a charity basis, and yet it is highly important that he have the opportunity to secure at least as good care as the hospital outpatient. This implies that all the facilities for an accurate diagnosis, for comprehensive treatment and for continuous personal supervision by a physician be

made available to him. The chief difficulty is an economic one. Its solution seems to lie in some plan by which the cost can be kept within his means. Various experiments along this line have been developed: formally organized clinics, including a hospital, such as that of the Mayos, in which the cost is carefully adjusted to the patient's ability to pay; pay and part-pay clinics, such as those of some of our large general hospitals, to which patients of a limited income are admitted; specially constituted groups of private physicians, largely for office practice, such as have developed in our western states; and less formally organized groups of physicians, such as the Boston White Cross, in which each physician functions independently, except that the usual fees are replaced by payments from a pooled income, which is derived from periodic and special-service contributions by the subscribing members. Although in the past the individual doctor cared for all the patients in his community, irrespective of their ability to pay, and evened up his income by good fees from the more affluent, the present tendency is to charge each enrolled person the same fee, irrespective of the amount of service required. Any of these systems leads to a controlled distribution among the physicians of the total professional income, but perhaps to a more equitable distribution, because it may be based on merit and the type of service rendered. Such an arrangement should prove especially attractive to the well-trained younger men in the profession, because they are in great demand by such groups and because from the beginning they can be assured of a reasonable income, of an association with older and more experienced practitioners and of more regular hours of work.

In spite, however, of the obvious advantages of group practice for those of moderate means or even of the wealthier classes, it must constantly be remembered that in at least one important respect it differs from hospital outpatient service: its financial aspect. The members of a hospital staff are on a salary or give their services without remuneration. Whatever compensation they may obtain bears no relation to the number or kind of patients cared for or to the type of service rendered. On the other hand, in the private group, large amounts of money are often handled, its distribution is determined more or less arbitrarily, opportunities for unfairness and discrimination arise, and personal jealousies among the participants not infrequently develop. I do not wish to discuss this phase of private group practice, but merely to call attention, in connection with it, to the importance of honest and open financial arrangements that will prevent unfair practices,

such as fee-splitting, the unnecessary use of professional and technical facilities and questionable advertising.

Any such plan for the care of the patient of moderate means by a group of physicians and on a prearranged cost basis need not, however, interfere with a continuance of private practice, as now understood, so long as the other more favorable features of group care are in some way maintained. Many of the patients with an easily diagnosed and simply treated disease can, of course, be adequately managed by the practitioner functioning alone, but unless he has intimate association with a variety of physicians whose training and skills are along lines other than his own, unless ample technical assistance and physical equipment are available either to him or to his associates and unless he has the free time to take advantage of opportunities for reading and for study of the new developments in medicine, he is likely to fail in the provision of the best possible service for his other and more difficult cases. Evidence of an appreciation of the importance in private practice of such professional associations, such mechanical aids in diagnosis and treatment and such continued education is now apparent in the

tendency of the physician to seek offices in a hospital or professional building, where these associations and physical facilities are available, in his interest in postgraduate courses of study and in the rapidly mounting membership of our national societies.

Finally let me emphasize, however, that, no matter what the organization for the practice of medicine, its ultimate success depends on the training, the skill, the intelligence and the character of the individual physician and especially on his capacity to render sympathetic, continuous and personal service to the individual patient.

Many other interesting aspects of the care of the patient readily present themselves, but my purpose today has been merely to arouse your interest in some of the broader problems and to indicate to what extent the present practice in the outpatient departments of our hospitals has already shown a solution of them. I trust that it may lead some of you to a determination not only to be proficient in the science and the art of medicine but also to strive to perfect for the public better facilities for good medical care.

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* PAIN IN CANCER OF THE FACE, JAWS AND NECK*

An End-Result Study of the Relief Afforded by Neurosurgical Methods

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IT HAS been generally believed that pain associated with cancer of the face, jaws and neck can be permanently relieved by some neurosurgical procedure whenever the patient and the doctor make up their minds to have it carried out. Furthermore, except by those who are familiar with the intimate details of cancer therapy, it is also widely assumed that the pain associated with cancer in these locations is traceable to the disease and not to the methods used in treating it. Based on these assumptions, operations that denervate the diseased areas have always been held in reserve until the last possible moment. This report of an end-result study of 30 cases of cancer demonstrates the inaccuracy of both hypotheses. Superficially the findings are most discouraging, but they emphasize, nevertheless, certain fundamental truths that can be expected to point the way in the future to not only greater comfort for these

patients but also to the promise of greater efficiency in cancer therapy.

All these patients were referred to me for relief of pain. Except so far as it was required by such emergencies as a sudden hemorrhage, the therapy, while the patients were under my care, was directed toward that end alone. Fourteen cases came from the Collis P. Huntington Memorial Hospital. Four patients died while under treatment. One of these was not operated on but developed a fatal inhalation pneumonia in two weeks; another died from peripheral circulatory collapse associated with tuberculosis and cancer of the cervical lymph nodes and cancer of the lung and mediastinum; the third died because of cachexia and carcinomatosis; and the fourth death followed a ligation of the carotid artery for hemorrhage. Although all the others were asked to do so, only 3 patients returned to the Huntington Memorial Hospital for further care after their discharge from my wards. Three went to other public institutions, 3 made no further hospital visits anywhere, and 1 has been lost. Twelve patients were referred

*Read at a meeting of the New England Cancer Society at the Collis P. Huntington Memorial Hospital, Boston, November 7, 1940 (the statistics are correct to June 1, 1941).

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times, two being complete and the others being differential sections. The fifth and ninth cranial nerves were divided or pinched through a posterior approach in 3 cases. In one operation, both nerves were divided, and in the other two the ninth was divided, and the sensory part of the fifth squeezed in a hemostat. The combination of the ninth cranial nerve and the upper three posterior cervical roots on one side was divided twice; these structures and the fifth nerve in addition were divided once. For these procedures, the approach was through a combined cervical laminectomy and hemiccipital craniotomy. In addition, 1 patient had a high (second cervical) chordotomy, and 1 a division of the cervical plexus in the neck.

Complications that influenced the choice and efficiency of the neurosurgical procedure were as follows: 2 patients, 1 of whom died, had a paralyzed larynx; 3 had osteomyelitis of the jaw (1 died); 3 had severe bleeding from the cancer; 2 had demonstrable brain and abdominal metastases (1 died); 2 had active local infections, one of which extended into the operative wound; 1 had a complete peripheral facial palsy on the involved side; 1 had an idiosyncrasy toward novocain (previously unknown) and died from that cause as he was being prepared for operation; and 2 were obviously very bad surgical risks.

The immediate results of the operative therapy were good and appeared to promise well for the future. Twelve patients were not relieved. Ten were not operated on, and 2 died within forty-eight hours of operation. One left against advice without treatment, and 1 was relieved by cobra venom for a month. One was relieved of pain but had severe cerebellar symptoms after operation, 13 were comfortable when they left the hospital, and 4 are still in the hospital following operation. Thus, of these 21 patients subjected to neurosurgical procedures, 13, or 62 per cent, were discharged from the hospital or died in the hospital relieved of pain. Of the 9 not operated on, 2, or 22 per cent, were relieved for a month or more. Within six months of their discharge, two thirds of this group had died. One may conclude, therefore, that at the time of leaving the hospital following treatment for pain, the patient with extensive cancer of the face, jaws and neck has almost 50 per cent greater chance of getting relief if he is operated on than he has with nonoperative therapy. Furthermore, since 41 per cent of the operated patients lived longer than six months after seeking neurosurgical relief, whereas only 22 per cent of the nonoperated group survived for the same period, it cannot be argued that the risk of operation is a deterrent to surgery. This immediate success attendant on denervation therapy doubt-

less accounts for the widespread belief in its efficacy, even when it is used inexcusably late in the course of the disease.

Twenty-four patients were followed to an end result of either death or established relief of pain (Table 1). The longest follow-up period was four years. So far as is known, this patient, who was not operated on, died unrelieved in Ireland. The shortest period was two months. This patient was not operated on and had partial relief following the drainage of an abscess in a carcinomatous mass in his neck. Two patients—both operated cases and both relieved of pain at their discharge from the hospital—have been lost. Four others are still under treatment in the hospital.

Only 1 of the remaining 22 patients is alive today. This one survivor—and this is the only such case in the entire group—is completely relieved of both pain and cancer three years and seven months after his neurosurgical operation and five years and one month after his first symptom. This man, who was referred by Dr. Charles Lund, was fifty-nine years of age and had a cancer of the cheek without local metastases. His pain started a year and three months after his first symptom and followed x-ray therapy. He was denervated three months later by division of the fifth and ninth cranial nerves in the posterior fossa. He was invalided for a number of months by cerebellar symptoms, but these have since disappeared. The relief of his pain was complete immediately after the operation and has remained so. The only other patient with a significant survival period is a woman of sixty, who also had a cancer of the cheek without local metastases. She was referred by the Huntington Memorial Hospital. A differential section of the sensory root of the fifth nerve was done five years after the start of pain and eight years after the first symptom. This patient's pain started before she received x-ray therapy and, indeed, was relieved by the first radiations. She had relief of pain for fifteen months after she was operated on. The tumor recurred, and she died in pain two months later.

Two other patients had complete relief for a short time before dying of their cancer; one for two months and the other for seven days. Both had local metastases. The patient with cancer of the parotid gland obtained no relief from division of the ninth and upper cervical nerves, and subsequently went to Philadelphia, where she received treatment by refrigeration. This also was not successful, and she eventually died thirteen months after the neurosurgical operation. Every other patient is dead or still under treatment. Of the former group, one lived for nineteen

months, but all the rest died within seven months after neurosurgical treatment. All died in pain and with no more than very temporary relief from these procedures

Certain conclusions relative to the treatment of the pain associated with cancer of the face, jaws and neck seem to me to be inescapable. These are that little if any relief can be expected from either medical or neurosurgical procedures that are initiated after the cancer has metastasized locally. If, despite that fact, surgical denervation is decided on, however, it carries no greater immediate risk than medical therapy and offers a much better chance of affording temporary relief.

It also seems reasonable to assume that therapeutic radiation of the malignant area is a significant factor in the causation of the pain that develops in association with cancer of the face, jaws and neck. Based on that assumption, the purpose, extent, effectiveness and pain-producing possibilities of any proposed x-radiation, as well as its relation to the possible effect that it may have on the cancer, should be carefully assessed in advance. It should never be countenanced when its effect is uncertain, or if this treatment is proposed because all other forms of therapy have been recognized as being useless.

Despite the discouraging results experienced in this series of patients, I am convinced that neurosurgery has its place in the treatment of cancers of the head and that it will prove useful when properly applied to this problem. The success following the early or premetastasizing denervation of the malignant area in 2 cases should be neither overlooked nor ignored. Under similar circumstances, it should be possible to duplicate this success in other patients. This will be possible, however, only when it is recognized that denervation

of the cancer-bearing area *must* precede the development of local metastases. This will mean that, as the malignancy of the tumor increases, the need for early effective denervation increases likewise, a requirement that if carried to its logical conclusion will, in certain cases, doubtless mean complete denervation by neurosurgery before the pain develops. This procedure was carried out in 1 case in this series. This will apply particularly to those cases that require large amounts of radiation, and offers not only the promise of future freedom from pain but, because of the local anesthesia associated with the denervation, the expectancy of greater efficiency in the treatment of cancer.

SUMMARY

The effect of neurosurgical procedures on the pain associated with cancer of the face, jaws and neck is analyzed.

Thirty cases are reported, in only 2 of which the patients had relief and were alive at the end of any significant follow up period.

Evidence is presented to demonstrate that the development of pain in such cancer bearing areas is associated with x-ray therapy.

Neurosurgical or any other procedures will almost certainly prove to be useless in the relief of this type of pain if provided only after the cancer has metastasized locally.

It is strongly recommended that surgical denervation of the cancer bearing areas in the face, throat, neck and jaws be performed as the first step in the treatment of the malignant growth, not only as a prophylaxis against later pain but also as an aid to greater efficiency in the therapy of the cancer because of the associated local anesthesia that is thus produced.

ASPIRATION BIOPSY, WITH A DESCRIPTION OF A NEW TYPE OF NEEDLE*

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ASPIRATION has undoubtedly been used to withdraw fluids from various parts of the body ever since hollow needles were first added to the medical armamentarium, but the use of aspiration to obtain specimens from solid masses has

Forkner⁶ described the use of needle biopsy at the Collis P. Huntington Memorial Hospital in Boston to obtain material from lymph nodes. He used a dental broach, constructed on the principle of a fishhook, which he passed through the lumen

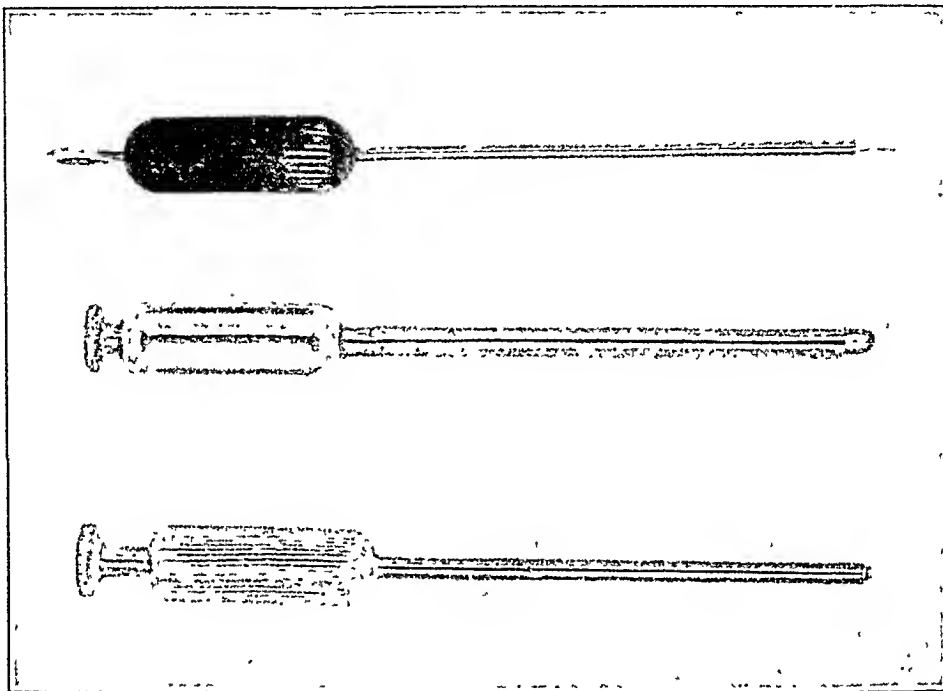


FIGURE 1. *Three Models of Mixer's Biopsy Punch.*

a much shorter history. About 1900 Dr. Samuel Mixer, of Boston, devised a biopsy punch that is still in use at the Massachusetts General Hospital to obtain specimens from brain tumors.¹ It consists of a hollow needle fitted with a blunt-nosed obturator, and has a hub that will receive the tip of a syringe for aspiration of tumor tissue. Figure 1 shows three models of this punch. Grieg and Gray² used aspiration biopsy to obtain specimens from lymph nodes as early as 1904. Guthrie,³ in 1921, reported the use of aspiration biopsy of lymph nodes and Barringer,⁴ in 1922, described a needle with a small cutting screw at the point, devised by Goeller, with which specimens were withdrawn from the prostate in cases in which the diagnosis was in doubt. Martin and Ellis⁵ state that needle biopsies have been used at the Memorial Hospital in New York since 1926. In 1927

of a 17-gauge or 18-gauge needle to secure more material than he could with the needle alone. Needle or punch biopsies did not come into common use, however, until about ten years ago, when the advantages and possibilities of the method became more widely recognized.^{5, 7-18}

Biopsy by aspiration through a large-bore needle has been more successful in obtaining specimens from deep-lying tumors than biopsy by a punch, since the latter often loosens pieces of tissue, especially in cellular tumors, the removal of which is not always successful. Aspiration with a syringe provides a good means of withdrawing a piece of tumor tissue, once it has been loosened, but difficulty is often experienced in causing a fragment of tumor to be loosened with the ordinary needle. No entirely satisfactory combination of a punch and aspiration has yet been devised because of the problem of making a mechanically satisfactory punch within the lumen of a needle in a size within practicable limits.

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An ordinary needle of 14 to 18 gauge with a tightly fitting syringe of 5-cc. to 20-cc. capacity often suffices to obtain a satisfactory specimen of a tumor, and enables the pathologist to make a diagnosis. Usually, however, only a few isolated tumor cells or small groups of cells can be obtained.

Aspiration biopsies, and have used it for about two years with considerable success. It was devised to obtain larger fragments of tissue, and at the same time to keep the needle simple and inexpensive.

By taking a 14-gauge needle with the obturator

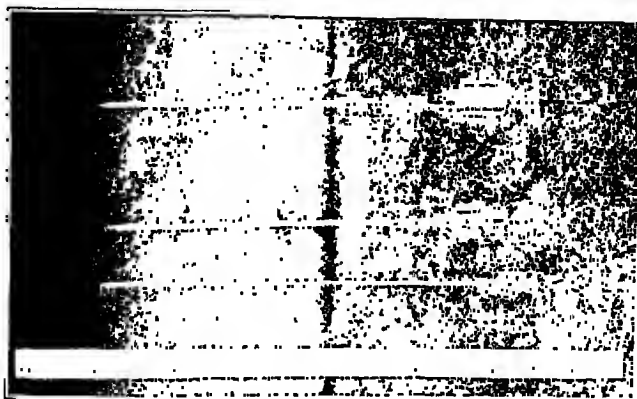


FIGURE 2. Two Models of the Author's Needle for Aspiration Biopsy.
The lower one, with obturator withdrawn, is provided with a Luer-Lok hub.

With experience, some pathologists are willing to make a diagnosis on this meager material, but the problem is admittedly made easier when a larger specimen is provided for a study of the structure

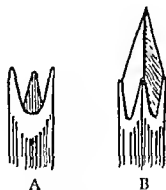


FIGURE 3

Detail of the tip of the author's needle, with the obturator withdrawn (A) and inserted (B).

of the tumor as well as of the individual component cells.

Dissatisfaction with the material secured by needle biopsy is evinced by the introduction of numerous new models of punches and needles, each designed to obtain larger specimens. Punches or needles were developed by Hoffman¹⁹ in 1931, Hoffman¹² in 1933, Lindblom²⁰ in 1935, Lowsley²¹ in 1935, Corriero²² in 1937, Neumann²³ in 1938 and Silverman²⁴ in 1938.

I have also designed a needle (Fig. 2) for as-

piration biopsies, and making three bevels at the point, instead of the usual single bevel, a trocar point is made, and when the obturator is withdrawn, the needle is left with three cutting teeth (Fig. 3). When the needle is rotated, the teeth act as a trephine to core out pieces of the tumor. If suction is provided by a syringe simultaneously with the rotation, the loosened fragments are easily removed.

After application of an antiseptic to the skin, a wheal is made with novocain solution, and a minute stab wound is made with a sharp-pointed knife blade. The needle, with its obturator, is introduced until it is felt to engage the periphery of the tumor. The obturator is then withdrawn, leaving the three-toothed sheath in position. A 10-cc. or 20-cc. syringe is attached, and the plunger partly withdrawn to produce a vacuum. The plunger is grasped between the fifth finger and the hypothenar eminence of the right hand, and the thumb and index finger rest against the rim of the barrel of the syringe to hold the plunger partly withdrawn to maintain the vacuum. The barrel of the syringe and the needle are then rotated as a unit with the left hand and advanced into the tumor, whereas the right hand still holds the plunger tightly but permits the rim of the barrel to rotate between the thumb and forefinger.

Small pieces of tumor tissue are thus cored out, and the loosened fragments, together with some blood, are drawn into the shaft of the needle. The needle is advanced to the opposite side of the tumor, and the syringe and needle then drawn back out through the skin while suction is main-

eliminate this difficulty, a Luer-Lok needle-hub and syringe may be used, and the rotation made in the direction in which the lock is tightened.

A 10-cc. or 20-cc. syringe is most satisfactory for aspiration. A 5-cc. syringe may be used, but strong suction is more difficult to maintain with it. Larger

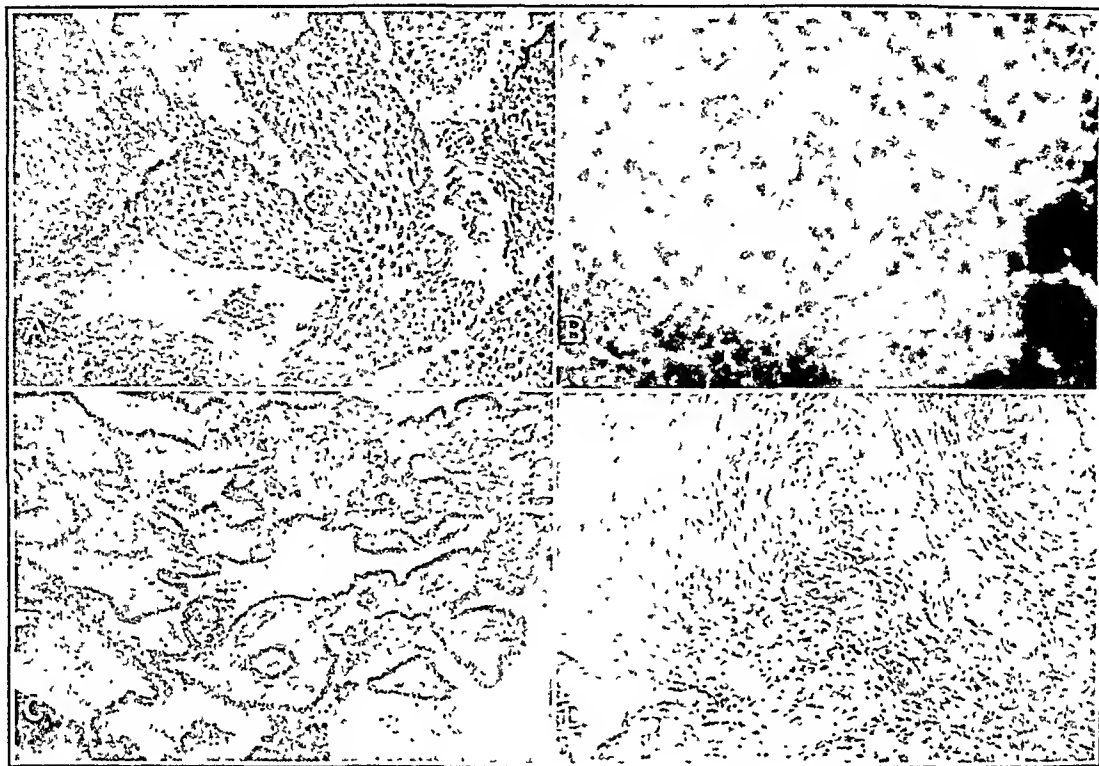


FIGURE 4. *Representative Biopsy Specimens Obtained by Aspiration.*

A. *Metastatic epidermoid carcinoma in a cervical lymph node ($\times 230$).* B. *Metastatic hypernephroma in the sternum ($\times 310$).* C. *Papillary adenocystoma of the thyroid gland ($\times 230$).* D. *Fibroma of the thigh ($\times 85$).*

tained. On reaching the skin, air rushes in through the needle and carries the fragments of tissue into the barrel of the syringe. The plunger is withdrawn, and the pieces of tissue mixed with blood are scraped out upon a large piece of hard fine-grained filter paper. The liquid portion of the material is absorbed by the filter paper. With a Beebe loupe having a magnification of two and one-half times, the specimen is carefully examined, and the pieces of tissue are teased out from the blood clot with a very fine pair of forceps or with dissecting needles and placed in a heap on a small piece of filter paper. With the magnification provided by the Beebe loupe, the fragments of tissue stand out clearly in the blood clot. The tissue amassed on the small piece of filter paper is then placed in 10 per cent formalin or Zenker's solution and subsequently prepared in the routine manner for histologic examination.

If the connection between the syringe and needle is not tight, the needle may become loosened by the rotating motion and the vacuum destroyed. To

sizes are more awkward to handle. A disadvantage of many syringes is the small size of the lumen of the tip of the syringe, often considerably smaller than the lumen of the needle used. The pieces of tissue may, under these circumstances, be held up at the tip of the syringe. This difficulty may be eliminated by using a metal-tipped syringe, which is not only stronger, but permits an instrument maker to enlarge the hole in the tip if it is too small. Attention should therefore be paid to this point in purchasing a syringe for use in aspiration biopsies.

The method described above has been quite successful, and has, on occasion, succeeded when attempts to obtain a specimen by using an ordinary needle have failed (Fig. 4). It has proved more successful than an ordinary needle in obtaining specimens from tumors with a fibrous stroma.

INDICATIONS FOR ASPIRATION BIOPSY

Aspiration biopsy is employed with great circumspection, and the indications for its use have

gradually become more clearly defined. In ulcerated and superficial tumors, biopsy can satisfactorily be done by removal of a specimen by the usual methods from the surface. Aspiration biopsy, therefore, finds its place in nonulcerated and deeplying tumors. It is of greatest use in confirming the clinical diagnosis in inoperable tumors, usually antecedent to irradiation treatment, and it should not be employed in operable lesions unless the needle tract can be made to lie wholly within the tissue that is to be excised.

In cases of inoperable tumor, aspiration biopsy is often indicated for pathological confirmation of the diagnoses. By aspiration biopsy a specimen is obtained from many tumors that would otherwise have no biopsy because of the complexity of the procedure by the usual surgical methods, because of the prolonged hospital stay and additional expense or because of the patient's refusal through fear of a surgical procedure. Many patients have an aspiration biopsy performed in the outpatient department, and need not be admitted to the hospital for treatment until the pathological report has been returned. Many hospital days are saved by this practice, an important consideration when the number of beds available for treatment is very limited. An additional advantage is that irradiation treatment may be proceeded with at once after a diagnosis has been confirmed by aspiration biopsy. After biopsy by surgical incision, on the other hand, it is advisable in many cases to postpone treatment for several days, so that healing of the wound is not interfered with when large doses of x-ray or radium are planned.

Aspiration biopsy is exceedingly useful in confirming the presence of metastatic cancer in inoperable lymph nodes antecedent to irradiation treatment when the primary lesion is unknown, when it is inaccessible or less accessible to biopsy, or when it has previously been removed elsewhere and a pathological report is not available. These circumstances occur most commonly in cervical lymph nodes. When there is doubt whether enlarged operable cervical lymph nodes are involved by metastatic carcinoma in lesions of the lip and mouth, it is preferable to do a neck dissection without preliminary aspiration biopsy, if the primary lesion is controlled.

Aspiration biopsy is used only rarely when a diagnosis of lymphoma is suspected, since in the diagnosis and subclassification of tumors of this group it is desirable to have the architecture of the entire lymph node available for pathological examination. In these cases, therefore, a biopsy by surgical excision of a lymph node should always be performed.

In tumors of the parotid gland, aspiration biopsy is indicated only to confirm the diagnosis in inoperable tumors. If the tumor is operable, aspiration biopsy is contraindicated, since the complete specimen will be available for examination after excision, and spilling the cells along the needle tract by aspiration biopsy cannot be done without risk of recurrence unless the entire tract can be removed with the subsequent excision of the tumor. In cases in which the differential diagnosis between a malignant and a benign parotid tumor must be made, aspiration biopsy yields inadequate information.

In breast tumors, aspiration biopsy has also been reserved largely for inoperable lesions that it is planned to treat by irradiation. Carcinomas of the breast that are accompanied by inflammation fall into this class, since in these cases difficulty is often experienced in the healing of the wound of an open biopsy. In differential diagnosis of benign and malignant lesions of the breast, too frequently only a small focus of carcinoma in an otherwise benign lesion occurs, and an aspiration biopsy should not be relied on to find it. In these cases surgical exploration and frozen section are more reliable procedures. It has been suggested in the literature that aspiration biopsy is useful in determining whether or not palpable axillary nodes are involved in carcinoma of the breast. However, this does not seem to be a proper indication for aspiration biopsy, since in every operable carcinoma of the breast, the axillary lymph nodes should be removed whether they are palpable or not, because of the fallibility of clinical examination in judging whether metastasis has or has not occurred.

Aspiration biopsy has been reported to be of value in obtaining specimens from lung tumors. For this purpose I have used it to a very limited extent, because this procedure should be reserved for confirmation of the diagnosis in patients in whom no attempt at surgical removal is planned, and because of the risk of implantation in the chest wall and pleural cavity.

I have not used aspiration biopsy for abdominal tumors, since biopsy under direct vision through a small incision or through the peritoneoscope is a safer procedure.

Needle and punch biopsies have from their beginning been found useful in securing specimens from carcinomas of the prostate gland because of the difficulty in obtaining specimens by open operation when confirmation is desired. Although failure to obtain a satisfactory specimen may frequently occur, a successful result may save the patient a major operative procedure.

A carefully performed aspiration biopsy may occasionally be used with benefit in bone tumors if the history, physical examination and roentgenographic and blood chemical studies still leave doubt concerning the therapeutic procedure indicated. However, in tumors of the bones of the extremities, it is safer to perform an open biopsy distal to a tourniquet, to examine a specimen by frozen section and to amputate, if indicated.

There is rarely the need for an immediate diagnosis of a tumor by smear. Such diagnosis is rarely an emergency, and the pathologist should be given the opportunity for more careful study of larger specimens. The occasional desirability of an immediate diagnosis usually comes on the operating table, where a frozen section should be made available.

It should be emphasized that failure to obtain a positive pathological report by aspiration biopsy should not be interpreted as meaning that no tumor is present, or that the tumor, if present, is benign. Only a positive pathological report is significant.

SUMMARY

A needle employing the principle of the trephine is described for use in obtaining biopsy specimens by aspiration.

The greatest use for aspiration biopsy has been

found in confirming the clinical diagnosis in inoperable tumors antecedent to radiation treatment.

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REFERENCES

1. Mixter, W. J. and Simmons, C. C. personal communications
2. Grieg, E. D. W. and Gray, A. C. H. Note on the lymphatic glands in sleeping sickness. *Brit. M. J.* 1:1252, 1904; *Lancet* 1:1570, 1904
3. Guthrie, C. G. Gland puncture as a diagnostic measure. *Bull. Johns Hopkins Hosp.* 32:266-269, 1921.
4. Barringer, B. S. Carcinoma of prostate. *Surg., Gynec. & Obst.* 34:168-176, 1922
5. Martin, H. E. and Ellis, E. B. Biopsy by needle puncture and aspiration. *Ann. Surg.* 92:169-181, 1930
6. Forkner, C. E. Material from lymph nodes of man. *Arch. Int. Med.* 40:532-537, 1927.
7. Ball, R. P. Needle (aspiration) biopsy. *J. Tennessee M. A.* 27:203-206, 1934
8. *Idem* Needle (aspiration) biopsy. *J. A. M. A.* 107:1381, 1936
9. Coley, B. L., Sharp, G. S. and Ellis, E. B. Diagnosis of bone tumors by aspiration. *Am. J. Surg.* 13:215-224, 1931.
10. Ferguson, R. S. Prostatic neoplasms their diagnosis by needle puncture and aspiration. *Am. J. Surg.* 9:507-511, 1930
11. Friedman, M. The clinical value of puncture biopsies. *Radiology* 23:429-437, 1934.
12. Hoffman, W. J. Punch biopsy in tumor diagnosis. *Surg., Gynec. & Obst.* 56:829-833, 1933
13. Martin, H. E. and Ellis, E. B. Aspiration biopsy. *Surg., Gynec. & Obst.* 59:578-589, 1934.
14. Martin, H. E. and Stewart, F. W. The advantages and limitations of aspiration biopsy. *Am. J. Roentgenol.* 35:245-247, 1936
15. Robertson, R. C. and Ball, R. P. Destructive spine lesions diagnosis by needle biopsy. *J. Bone & Joint Surg.* 17:749-758, 1935
16. Sappington, S. W. and Favorite, G. O. Lung puncture in lobar pneumonia. *Am. J. M. Sc.* 191:225-234, 1936
17. Sharp, G. S. The diagnosis of primary carcinoma of the lung by aspiration. *Am. J. Cancer* 15:863-870, 1931
18. Stewart, F. W. The diagnosis of tumors by aspiration. *Am. J. Path.* 9:801-812, 1933.
19. Hoffman, W. J. New technic and instrument for obtaining biopsy specimens. *Am. J. Cancer* 15:212-220, 1931.
20. Lindblom, K. Instruments for taking biopsy specimens with description of a new model. *Acta radiol.* 16:295-300, 1935
21. Lowsley, O. S. A new device for securing biopsy specimens. *J. Urol.* 33:417-421, 1935.
22. Corriero, W. P. A new type biopsy needle. *Am. J. Surg.* 37:341, 1937.
23. Neumann, R. Das Histotom. *Arch. f. Klin. Chir.* 193:579-583, 1938
24. Silverman, I. A new biopsy needle. *Am. J. Surg.* 40:671, 1938

SPONTANEOUS RUPTURE OF THE SPLEEN IN INFECTIOUS MONONUCLEOSIS

Report of a Case

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THAT rupture of the spleen is not a rare event is attested by the frequency with which such cases are reported. Although trauma, both severe and slight, heads the list of causes, one finds mention of the following conditions as etiologic factors: malaria, typhoid and typhus fever, echinococcal cyst, influenza, leukemia, polycythemia vera, hepatic cirrhosis, subacute bacterial endocarditis, tuberculosis, hemophilia and various acute infections. There are also many reports of spontaneous rupture of normal spleens.

In 1932 Attlee¹ reported a case of spontaneous rupture of the spleen in a twenty-three-year-old woman in whom a diagnosis of Vincent's angina had been made. From the clinical and laboratory reports, it seems highly probable that this was an

unrecognized case of infectious mononucleosis. Aside from this case, the literature contains no report suggesting rupture of the spleen in this condition. In view of the rarity of pathological reports concerning infectious mononucleosis, the following case is of sufficient importance to be reported.

CASE REPORT†

R. S., a 23-year-old consulting engineer, was admitted to the Heywood Memorial Hospital in Gardner, Massachusetts, on October 20, 1937, complaining of severe abdominal pain. Two and a half weeks before entry, he developed headache and tender cervical lymph nodes. One week before entry, he consulted a physician because of a very sore throat. The throat was found to be in-

†Reported through the courtesy of Drs. Harold C. Frey and Albert F. Lowell of Gardner, Massachusetts.

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flamed, and the postcervical lymph nodes were enlarged and slightly tender. The patient continued to work although he felt very miserable, and experienced two shivering chills the day before entry, with profuse sweats that night. The morning of entry he got out of bed to go to the toilet, and was seized with a sudden agonizing pain in the abdomen radiating up to the sternum and through to the back. A physician was summoned and found the

discharged 3 weeks after entry, and in another 3 weeks was able to return to work, entirely recovered. Three years later he is reported to be well.

The results of the blood examinations are given in Table I. The preoperative blood films showed the platelets to be normal in number, postoperatively they were markedly increased. The sheep-cell agglutination test for infectious mononucleosis was positive in a dilution of 1:1256

TABLE I Blood Examinations

DATE	RED CELL COUNT	HEMOGLOBIN (NEWCOMER)	WHITE CELL COUNT	DIFFERENTIAL COUNT							TYPICAL MONOCYTES	ATYPICAL MONOCYTES
				NEUTROPHILS	EOSINO- PHILS	BASO- PHILS	LARGE LYMPHO- CYTES	SMALL LYMPHO- CYTES				
10-0	$\times 10^6$	%	$\times 10^3$	%	%	%	%	%	%	%	%	
10-20	4.2	90	16.9	40				30			30	
10-24			14.6	53				45				
10-25	3.9	75	12.4	47				33		2		
10-25	3.8	75	15.0	5			3	34		6	20	
10-26	3.5	70	14.0	0	3	1		10		5	11	
10-28	4.2	75	12.2	62	5		1	32				
10-29	4.3	83 (Sahl)	11.1	45	4	1		25		15	10	
10-30	4.0	75	9.6	65	2		3	26		4		
10-31	4.1	80	11.6	63	3		7	27				
11-1	4.5	80	12.8	59	1	1	14	25				
11-1	3.5	70	11.8	53	*	2		39				
11-2	4.2	75	8.9	39			12	26		4		
11-4	4.5	80	9.0	66			6	26		2		
11-5			10.0	67	4		4	22		3		
11-6			8.3	49	4	1		40		6		
11-7	4.3		6.6	57	4		4	33		2		
11-8			7.8	58		2		26		7		
11-9			8.0	61	3		8	23		5		
11-10		75	10.2	62	2			24		5		
12-2	4.3	92 (Sahl)	8.9	66	2			29		3		

patient in semishock, sweating profusely, with a pulse of 90 and a temperature of 97°F. He was taken to the hospital at once, and although extremely weak, he was able to walk to his room.

Physical examination showed the patient to be pale and sweating. He suddenly vomited blood streaked mucus. The pulse was 100, the blood pressure 130/65, and the temperature 98°F. The postcervical lymph nodes were enlarged and tender. The pharynx was inflamed and beefy, with two minute ulcerations on the posterior wall. The soft palate was inflamed and swollen. The heart and lungs were normal, although the patient complained of substernal pain on deep inspiration referred to the back. The abdomen was tense over the epigastrium with generalized tenderness in both flanks more on the left, and the patient complained bitterly of generalized crampy pain, most intense in the epigastrium. The urinary bladder was distended and the patient was unable to void. Neurologic examination was negative.

During the afternoon of the day of entry the patient's pulse rose to 110, the systolic blood pressure fell to 100, the temperature rose to 100°F, and the abdomen became distended and rigid with marked generalized pain and tenderness demanding laparotomy. Operation seemed advisable, and when the peritoneum was opened a large quantity of free blood containing clots was encountered. The appendix, which was found to be large and to contain a concretion, was removed. The spleen was felt on exploration to be markedly enlarged and was exposed through a second incision. The capsule was seen to be ruptured and to be draining blood freely. The spleen was removed. The surgical convalescence was entirely uneventful. The throat inflammation however was rather slow in clearing up, and a moderate generalized lymphadenopathy was noted. The patient was

The blood Hinton Wassermann and Widal reactions and the agglutination test for undulant fever were negative. Urinalyses were negative. Throat smears showed organism typical of Vincent's angina.

The pathological report by Dr. Shields Warren was as follows:

The spleen with partly stripped capsule measures 18 by 12 by 6 cm and weighs 660 gm. The capsule has been almost entirely stripped from one side, and reveals clotted blood forming a layer about 0.5 cm thick covering almost all this side. The other side of the spleen is covered by very slightly wrinkled, but otherwise smooth, shiny membrane. Section shows the spleen to be partly fixed. From the central portion, which is very soft, a moderate amount of pulp can be scraped. A few small hemorrhagic foci can be seen within the fixed tissue near the periphery. Microscopically the normal structure of the spleen is well preserved. The trabeculae are not enlarged. The follicles are distinct and of the usual size and present no inflammation or hyalinization. The sinusoidal structure is less prominent than normal owing to the large number of cells filling the sinuses. There is a relatively small amount of blood in the pulp. A diffuse distribution of powdery granules of hemosiderin is present. The pigment is found in the endothelial cells of the sinuses and in free phagocytic cells in the sinusoidal spaces. The cells filling the sinuses are free endothelial cells, which are most numerous large and small lymphocytes, plasma cells, polymorphonuclear leukocytes and a few undifferentiated cells suggesting myelocytes. Mitotic figures are rare. One portion of the spleen shows an area of unorganized hemorrhage. The microscopic picture is compatible with infectious mononucleosis.

Microscopic examination of the appendix shows es

essentially the picture of healed appendicitis. The serosal lymphatics contain a few clusters of lymphocytes. There are scattered lymphocytes, chiefly perivascular, in the muscularis. There is also a slight degree of fibrosis in the inner portion of the muscularis and the submucosa. The secondary nodules of the lymphoid tissue of the submucosa are sharply demarcated, and contain cells that are large, with rather vesicular nuclei. Mitotic figures occur, but they are no more numerous than one frequently finds. Some of the cells are less clearly defined than usual. The mucosa itself is essentially negative. There is nothing distinctive in the appendix that would associate it with infectious mononucleosis.

Infectious mononucleosis is by no means a rare disease, and if the condition is kept in mind, there should be no difficulty in recognizing it. The cardinal symptoms are fever, headache, sore throat, generalized malaise and tender, enlarged lymph nodes, regional or general. The spleen is usually palpable. The blood picture, although not pathognomonic, is highly suggestive. One always finds an increased percentage of large atypical lymphocytes, with a corresponding decrease in neutrophils. The cells may suggest those seen in acute leukemias, and similar cells may be seen in infectious jaundice. In infectious mononucleosis there is very rarely anemia, and no reduction in the number of blood platelets, in contrast to that prac-

tically always found in acute leukemia. Usually in infectious mononucleosis there is a leukocytosis, but it should be kept in mind that a small percentage of cases have a definite leukopenia. Furthermore, in differentiating this condition from infectious jaundice, one must remember that icterus occurs in infectious mononucleosis in a certain percentage of cases. Lymphadenopathy, however, always precedes the icterus, so that the two conditions may be easily distinguished. The sheep-cell agglutination reaction, which becomes positive in infectious mononucleosis after about the tenth day of the disease, makes the diagnosis certain.

Although rupture of the spleen in this disease is very rare, its occurrence is serious enough to demand that infectious mononucleosis be treated with respect, and not on an ambulatory basis.

SUMMARY

A case of rupture of the spleen in the course of infectious mononucleosis is reported, together with the detailed pathological report of the spleen.

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REFERENCE

1. Attlee, W. Spontaneous rupture of an abnormal spleen. *Lancet* 1:91 1932.

MEDICAL PROGRESS

THE CAUSES AND TREATMENT OF EDEMA*

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EDEMA is an abnormal collection of fluid in tissue spaces. This may be a very localized phenomenon, or it may be generalized throughout the body. Few physical signs lend themselves so well as edema to physiologic analysis and interpretation and therefore it is not only frequently possible but highly desirable to understand the mechanism of edema production in any given case, so that the underlying cause can be specifically attacked and treatment can be made genuinely effective. There is a constant exchange of water and electrolytes and certain nonelectrolytes between the blood stream and the tissue spaces through the capillary walls. This interchange is kept in bal-

ance and the amount of tissue fluid is kept constant by two opposing pressures. The hydrostatic pressure within the capillaries tends to drive fluid out of the capillaries, whereas the osmotic pressure exerted within the capillaries, largely by the plasma proteins to which the capillary walls are normally nearly impermeable, tends to draw it back. Therefore, if either the hydrostatic capillary pressure is increased or the plasma colloid osmotic pressure is diminished, a condition favoring the development of edema results. A factor of importance not generally appreciated is the pressure exerted by the elastic subcutaneous tissues.¹ This tends to limit the amount of edema that forms in any given case, and also is in part responsible for the location of the edema—that is, other things being equal, edema fluid collects where the skin and subcutaneous tissues are relatively lax, as in the periorbital region. Under certain circum-

All articles in this series will be published in book form; the current volume is *Medical Progress: An annual, 1940* (Springfield, Illinois: Charles C Thomas Company, 1941. \$4.00).

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stances, protein escapes through the capillaries into the tissue spaces, or is laid down in abnormally great amounts, thus raising the colloid osmotic pressure within the tissues. A more accurate expression, therefore, of the balancing of the opposing pressures between capillaries and tissue spaces would be: hydrostatic blood pressure in capillaries plus tissue osmotic pressure equals subcutaneous tissue pressure plus plasma osmotic pressure; normally, the hydrostatic blood pressure and the plasma colloid osmotic pressure are the important factors involved.

In addition, the total electrolyte concentration of body fluids is significantly concerned with the water balance of the body. The organism attempts to maintain the composition of these fluids constant, even at the expense of gain or loss of water itself. Hence anything that seriously affects the electrolyte balance of the body, so that sodium or chloride is retained, may under certain conditions lead to edema. Excellent discussions of this problem are presented by Gamble⁶ and by Peters.⁷ Many of the factors affecting electrolyte and water balance are still unknown, but knowledge of the role of the endocrine glands in this regard is increasing.

CAUSES OF EDEMA

Increased Capillary Permeability

Toxic states—such as those from burns, bites, heat and cold, allergy, as manifested by urticaria or angioneurotic edema, and inflammation, as in cellulitis—all produce edema because of increased capillary permeability to protein and the local escape of fluid high in protein content into the tissue spaces, with a resultant increase in tissue colloid osmotic pressure. In some of these types of edema, the local release of a toxic substance, possibly histamine,^{8,9} may be responsible. This has led to the clinical attempt to "desensitize" persons who are subject to urticarial disturbances from exposure to cold, serum sickness, insulin hypersensitivity and so forth, as well as certain types of headaches, by administering graded small doses of histamine⁶⁻⁸ and by attempts to neutralize the histamine by giving histaminase,⁷⁻¹⁰ a histamine-destroying enzyme found in the gastrointestinal mucosa. As yet clinical reports of the use of histaminase have not been convincing enough to establish its value in this regard unequivocally, and the use of histaminase rests on no good physiologic foundation.¹¹

Generalized edema occurs in the early stages of acute glomerular nephritis. It is now believed by most authorities that the edema is a result of

the widespread capillary damage that occurs in this condition, with increase in capillary permeability.

Increased Hydrostatic Intravascular Pressure

Venous backpressure. Venous thrombosis or varicose veins are the commonest cause of unilateral or unequal edema of the lower extremities. Obstruction to the superior vena cava not uncommonly occurs with disease involving the superior mediastinum, such as aneurysm or tumor, and gives rise to a characteristic clinical syndrome. Inferior vena cava obstruction is much rarer but also results in a typical picture. Portal-vein obstruction, of course, characteristically leads to ascites. When dependent edema occurs, it tends to develop late and is due in part to the pressure of the ascitic fluid on the vena cava, and in part to the hypoproteinemia, which is generally present.

When the venous pressure is generally raised, it almost always means congestive heart failure of the right-sided type. In addition to edema, distention of the peripheral veins is usually found, with jugular veins that remain engorged even in the semirecumbent position, and an enlarged tender liver. The only exception to heart failure as the cause of such a generalized increase in venous pressure is cardiac tamponade, which may be produced by fluid in sufficient quantity in the pericardial sac, or a constricting pericarditis.

Arteriolar dilatation. When arterioles become widely dilated, blood pressure within the capillaries increases and a condition favoring edema formation exists. This may occur regionally in connection with nerve injuries, since involvement of somatic nerves may be accompanied by vasomotor paralysis, although vasomotor spasm is of more frequent occurrence under these circumstances. Vasomotor paresis may also be of central origin. For example, it has been shown that hemiplegia of cerebral origin is usually accompanied by diminished vasomotor tone on the affected side,¹² and edema of moderate degree is not uncommon over this area.

It is possible that one of the factors involved in the generalized edema that may occur in beriberi is peripheral vasodilatation due to involvement of the vasomotor system.¹³ Since, in this condition, heart failure may also occur, there may exist edema and a high venous pressure at a time when the circulation time is normal or shortened, a combination of events that is most unusual and is found in only two other types of congestive heart failure, that caused by hyperthyroidism and that secondary to arteriovenous aneurysm.

Lymphatic Obstruction

Chronic obstruction of the lymphatics draining an extremity gives rise to edema that is difficult to distinguish from that consequent on venous obstruction. It tends to be rather more brawny in character, and there is no color or temperature change. One remarkable tendency manifested by patients with such edema is the frequent development of superficial infections of the involved extremity, resembling lymphangitis or cellulitis.

Edema from lymphatic obstruction is not very rare. Although filariasis is unknown in this section of the country, and neoplastic lymphatic obstruction is usually dramatic and well recognized, a not very uncommon, but usually unrecognized, cause of edema of one or both legs is lymphatic obstruction due to pelvic inflammatory disease, which may have been inactive for years. Since such disease is also prone to lead to deep thrombophlebitis, the differentiation of the cause of the resulting edema may be difficult or impossible. An uncommon but interesting type of lymphedema is that known as Milroy's or Meige's disease,¹⁴ a familial affection of unknown etiology, involving one or both lower extremities.

Hypoproteinemia

Hypoproteinemia may occur as the result of deficient protein intake, of increased protein loss or of impaired formation of the plasma proteins. Severe grades of malnutrition in persons whose diets are unusually deficient in protein may lead to edema. In certain disturbances of the gastrointestinal tract (sprue, diarrhea and the changes due to massive resections and to the congestion of heart failure), the absorption of many vital food substances may be impaired, and in some cases the absorption and utilization of protein itself are interfered with. Many patients of this type who show hypoproteinemia have either deficient diets or disturbances of liver function as important causative factors.

Not uncommonly, a deficiency in protein intake is a contributory cause of an edema the major etiology of which is traceable to some other disease, for example, cardiac edema.¹⁵

Another important cause of hypoproteinemia is, of course, loss of plasma protein, and the commonest and most important channels through which this is lost are the kidneys. Edema resulting from this cause is known as "nephrotic edema" and is seen in the nephrotic stage of glomerular nephritis, in "lipoid nephrosis" and in amyloid disease. The correlation between clinical findings, physiology and pathology has been especially imperfect in this condition. It is generally accepted that protein is chiefly excreted through the glomeruli, and yet it

is frequently difficult to demonstrate clear-cut pathologic changes in the glomeruli, although recently by special staining methods glomerular lesions have been shown to occur in most cases of nephrosis. A controversy has long raged about whether lipoid nephrosis is a specific disease entity or a stage of glomerular nephritis, and if a specific disease, whether a primary renal disturbance or metabolic disorder, as contended by Epstein. It is not relevant to the subject at hand to enter into this controversy, except to mention that there has recently been reported a good deal of work bringing forward evidence of various sorts that the plasma and urinary proteins in nephrosis and even in the nephrotic stage of nephritis may be qualitatively different from normal plasma proteins.¹⁶⁻²⁰ Whether this difference is primary and possibly a cause of the proteinuria, or whether it is merely the result of the prolonged drain of chronic protein loss on protein formation is not yet established.

Other less common channels by which blood proteins may be lost, which may under certain circumstances be very important, are serous effusions, such as ascites, burned surfaces and, especially, hemorrhage, acute or chronic.

The factor in the causation of decreased plasma proteins that has received attention most recently is deficient protein formation. Although the sites of formation of all plasma proteins are not conclusively established, it is probable that the liver is specifically concerned, undoubtedly with fibrinogen and probably with albumin synthesis, and it is known that disease of the liver is frequently accompanied by hypoproteinemia.^{21, 22} Lowering of the plasma proteins is frequently considered a clinical test of poor liver function. Hypoproteinemia is usually found in advanced portal cirrhosis and is often a chief contributing factor in the ascites and edema found in this condition.

Low plasma proteins are not uncommonly present in patients with congestive heart failure. There are several possible factors involved. One, already mentioned, is the deficient protein intake of many of these patients. A second is protein loss through the kidneys and, to a lesser extent, in pleural and peritoneal effusions. A third is impaired protein formation, probably due to depression of liver function consequent on the hepatic congestion and anoxia. Another cause of the lowering of the protein concentration in the plasma is dilution of the blood, owing to hydremia, especially in patients in whom diuresis has or is about to set in.²³

Disturbances of Electrolyte and Water Balance

The composition of tissue fluid is kept extraordinarily constant, and even when it collects in

abnormal amounts, the change is quantitative rather than qualitative, since its composition remains essentially unaltered. The chief base or cation concerned is sodium, which makes up about 140 of the total of 150 millicivalents per liter. Anything that tends to increase the total amount of sodium in the body favors the production of edema, and conversely anything that depletes the total body sodium leads to dehydration. It is difficult for a normal person to change his body sodium materially because of the immediate and accurate adjustment the kidney is able to effect, but in any condition already present that predisposes to edema, it may be then possible to lessen the sodium present in the body, and hence the amount of edema, by withholding salt from the diet or by facilitating its excretion, as by the administration of an acid-producing salt, such as ammonium chloride or nitrate.

The role of the endocrine glands in electrolyte and water balance is being increasingly studied. Interestingly enough, many of the hormones of the endocrines that have been investigated have been found to lead to retention of sodium and chloride and hence of water, thyroxine being the major exception. Perhaps the most striking in this respect is the adrenocortical hormone. It is well known that a deficiency of this substance, as in Addison's disease, leads to sodium loss, rise of blood potassium, dehydration and shock. Administration of this hormone and of the synthetic desoxycorticosterone to normal and adrenalectomized animals, and to human patients with Addison's disease, causes sodium and water retention,²¹ and cases have been reported in which the giving of desoxycorticosterone in therapeutic doses to patients with Addison's disease has resulted in generalized edema and even in hypertension, hypervolemia, pulmonary edema and heart failure.²⁵⁻²⁶ It is possible that the hypertension and edema of Cushing's syndrome is associated with an excess secretion of adrenocortical hormone.²⁷

Most of the hormones of the ovary and testis (estrone, progesterone and testosterone) have been shown to produce salt and water retention.²⁸ An interesting clinical state is cyclic menstrual edema.²⁸⁻³¹ This rare condition is apparently an aggravation of a normal physiologic change in which many women retain significant amounts of water during the periods of maximal estrone secretion, that is, at the time of ovulation and even more during the days just preceding menstruation. The treatment of cyclic menstrual edema is not very satisfactory, although in individual cases success has been reported from the administration of the anterior-pituitary-like hormone obtained from the urine of pregnant mares and from the use of

Emmenin (an estrone containing preparation), as well as ammonium chloride and a low salt diet.³¹

During pregnancy, the majority of women retain water, and in a considerable percentage edema actually results. When such women in addition suffer from hypoproteinemia due to protein malnutrition or ingest an excess of salt, edema is especially likely to occur, and according to Strauss,³² in a certain number the clinical picture of pre-eclamptic toxemia develops. Weiss et al.³³ are of the belief that toxemia of pregnancy necessitates the presence of some unknown factor, apparently elaborated in the placenta.

It has been known for a long time that lesions of the posterior portion of the pituitary gland or some adjacent structure in the hypothalamus may lead to diabetes insipidus or polyuria due to failure of tubular reabsorption of water. The exact location of the lesion producing these conditions has been in dispute, some contending that it is in the base of the brain and others that the neurohypophysis is responsible. Dandy's³⁴ report demonstrates that when the posterior portion of the pituitary gland is deprived of its nerve supply through section of its stalk, diabetes insipidus may result. Extract of the posterior pituitary gland (pituitrin) or more specifically its pressor fraction, Pitressin, counteracts this disturbance, and its antidiuretic effect resides in its power to promote renal tubular reabsorption of water.³⁵⁻³⁶ It is also known that diabetes insipidus does not occur in the absence of the anterior portion of the pituitary gland, and there is evidence³⁷ that anterior-pituitary extract exerts a diuretic effect. It can be said, therefore, that normally the posterior portion of the pituitary gland exerts an antidiuretic and the anterior portion a diuretic effect, and that these opposing actions are in equilibrium.

Lack of thyroid hormone, as clinically seen in myxedema, gives rise to retention of tissue fluid high in protein content. As shown by Byrom,³⁸ this is due to an increase in the mucoprotein of the intercellular regions, the architectural skeleton that holds the cells together. As a result of this increase in protein in tissue fluid, its colloid osmotic pressure is increased, salt and water are retained and edema or more properly myxedema may result. The edema of hypothyroidism is thus of a unique type.

The administration of thyroid extract, or the clinical condition of hyperthyroidism, leads to the opposite effect—loss of interstitial protein, fluid and dehydration.

The effect of insulin in promoting water retention has been the occasion of a good deal of investigation and speculation. It is well known that

following the institution of insulin therapy in diabetic patients prompt gain of weight may occur, much of which is due to water retention.³⁹ This is apparently because the storage of glycogen is accompanied by water retention, whereas when fat metabolism predominates water is lost.

Clinical cases of edema following insulin administration have occasionally been reported. The causation of the edema is probably diverse. Rarely hypersensitivity to insulin, especially to protamine insulin, develops, with resulting urticaria or angioneurotic edema.³⁹ The edema that has been reported following diabetic coma and acidosis may well be due to the hypoproteinemia that frequently occurs. There is no evidence that insulin exerts any significant effect on sodium or chloride metabolism.⁴⁰

Hence, the endocrine glands undoubtedly play an important role in electrolyte and water balance. Most of them operate through their effect on sodium or chloride or protein retention. Posterior-pituitary extract is unique in that it apparently causes specific retention of water itself through its effect on the renal tubules. In the light of present knowledge, however, it cannot be said that endocrine disturbances are a frequent cause of marked clinical edema, or that therapy with hormonal preparations is often of value in the treatment of edematous states.

When edema occurs in patients with vitamin deficiencies the usual cause is hypoproteinemia due to protein malnutrition. Another type is the edema seen in beriberi, which has already been discussed. This may in part be due to congestive heart failure secondary to the effect of the deficiency on the heart itself, and in part to peripheral vasodilatation caused by vasomotor paresis. The present evidence indicates that this particular disturbance is largely or entirely the result of lack of vitamin B₁ and is relieved by the administration of thiamin. There may occur, however, edema in patients with deficiency of the vitamin B complex, which is not relieved by thiamin or by riboflavin but is cured by the giving of whole yeast.⁴¹ In other words, this edema, of undetermined nature, is due to the lack of an unidentified substance present in yeast. There is no evidence that lack of the other vitamins is a factor in the formation of edema.

Edema occurs not uncommonly in severely anemic patients, and this symptom, together with the breathlessness such patients usually manifest, has frequently led to the mistaken diagnosis of heart disease or heart failure as the primary cause of the clinical picture. It is true that anemia may precipitate heart failure in a patient with underlying heart disease, but edema as usually

seen in patients with anemia is of a different origin. Sometimes it is caused by hypoproteinemia, owing to an associated protein deficiency; often, however, the edema seen in anemia is explained by none of these causes.⁴² The severity of this is in general in proportion to the degree of anemia, and is aggravated by the administration of sodium salts. Occasionally, however, patients with untreated pernicious anemia fail to exhibit edema until after the institution of therapy and the beginning of improvement. The cause of this type of edema is still obscure.

TECHNICAL CLINICAL METHODS FOR EVALUATION OF EDEMA

The etiology of edema can usually be determined by a careful history, a physical examination and a routine urinalysis. Occasionally, however, further laboratory assistance must be called for. The most useful of these tests, and one that should be easily available, is determination of the plasma or serum proteins. These normally vary from about 6 to 8 gm. per 100 cc. It has been shown that, as they become diminished, water accumulation in the tissues increases because of the lowered plasma osmotic pressure, and when they reach a level as low as 5.0 to 5.5 gm., this fluid retention is usually manifest as edema.⁴³ A more accurate gauge than the total plasma proteins is the determination of the levels of the albumin and globulin separately. Normally, albumin makes up about 60 per cent of the total protein, and globulin 40 per cent. Any lowering of the plasma proteins is mainly at the expense of the albumin fraction, which, having the smaller molecule, is more easily lost through the capillary or glomerular walls but also for the same reason has a greater effect on osmotic pressure. A lowering of the plasma albumin from its normal of about 5.0 gm. to 2.5 gm. or below is likely to result in edema.

A simple and highly accurate estimate of the total plasma proteins can be reached by determining the plasma or serum specific gravity, which varies in direct proportion to the protein.⁴³ There are now available several ingenious methods by which the plasma specific gravity can be quickly and accurately determined.⁴⁴⁻⁴⁶ These, in the main, depend on the speed of fall of a drop of plasma or serum through a liquid of known density with which it is immiscible, or the insertion of such a drop into a liquid with a differential density varying from light to heavy and determining the level in the liquid the drop attains. Since the determination of hypoproteinemia is so frequently of value, it is to be anticipated that the estimation of plasma proteins will soon come to be a routine laboratory procedure that in clinical usefulness will

rank with nonprotein-nitrogen and blood-sugar determinations

The direct measurement of venous pressure can be carried out quickly and easily by the insertion of a needle (18 to 19 gauge) into an antecubital vein, connecting it with a manometer filled with saline, and relating the height of the saline column to the estimated level of the right auricle.⁴⁷⁻⁴⁸ This normally is either 10 or 15 cm of water or less, depending on whether the reference point is the front or back of the chest.

In most cases of congestive heart failure, this procedure is unnecessary, since the cause of the edema is evident and an estimate of the venous pressure can be made by determining the height to which the jugular veins remain filled with the patient in the sitting or semireclining position. However, there are times when one cannot be sure whether edema of the lower extremities is due to local venous obstruction or the generally increased venous pressure of cardiac failure, in which the findings of an elevated venous pressure in the arm will answer the question. Moreover, by measuring the venous pressure in two places, as for example in each arm or in an arm and a femoral vein, venous obstruction sometimes can be diagnosed and localized.

Estimations of the various blood electrolytes are of greater value in states of dehydration than in edematous conditions, since, as already stated, in edema they may be quantitatively normal.

TREATMENT OF EDEMA

The treatment of edema, like that of most other pathologic states, resolves itself into an attempt to attack the underlying cause directly, and into nonspecific measures.

Nothing need be said here about the specific treatment of localized allergic or inflammatory edema, of that resulting from venous obstruction, or of the edema of congestive heart failure.

The logical way of treating edema due to hypoproteinemia is, of course, to raise the plasma proteins. When these are low because of diminished intake they can be easily increased by giving a diet adequate in protein. When the difficulty is caused by increased loss, results from high protein feeding are less satisfactory but still the most logical procedure. If liver disease is responsible for impaired production, the value of feeding excessive protein is problematical.

Recently, experimental work has been reported regarding the intravenous administration of amino acids for the purpose of maintaining protein balance and of raising low plasma protein levels.⁴⁹⁻⁵¹ The results are interesting and suggestive but

still in the experimental stage, and more investigation is needed before the clinical value and safety of this procedure can be considered proved.

A successful way of temporarily raising plasma proteins is by the actual administration intravenously of the proteins themselves. For a long time this could be accomplished only by whole blood transfusion and this is still the procedure of choice if anemia exists. But if there is no deficiency in red cells, plasma transfusions, which are now in use and becoming increasingly available, are to be preferred, and the various methods for obtaining highly concentrated plasma solutions are rapidly being improved to a point where they will be widely applicable and the side reactions will be minimal.⁵²

For many years, it has been advocated that a substitute colloid be administered that will be nontoxic and will have the osmotic effect of plasma proteins. Acacia appeared to fulfill these requirements, and has been and is extensively employed. A few years ago, the use of acacia was largely abandoned, chiefly because of the many bad results reported, some of which were undoubtedly due to improperly purified and prepared acacia solutions. It was also believed that the repeated administration of acacia to a patient could in the long run be deleterious, since it might act by further depressing the plasma protein level. Recently, several reports from the Mayo Clinic¹ and elsewhere of the use of acacia with excellent results have revived interest in this substance, and further investigation of its value now seems warranted.

The first of the nonspecific measures to be attempted in the treatment of any widespread edema is the exclusion of sodium chloride and other sodium-containing salts from the diet, and possibly the attempt at increasing sodium excretion by the administration of an acid-producing salt, such as ammonium chloride (6 to 10 gm daily).

Urea in oral doses of 45 to 90 gm a day is also sometimes effective. Intravenously administered hypertonic solutions, such as glucose, sucrose, sorbitol and magnesium sulfate, may produce a diuresis, although a temporary one at best. These substances, in particular magnesium sulfate, are especially of value in conditions in which there are cerebral symptoms associated with cerebral edema. It should be remembered that all hypertonic solutions, if given rapidly in fairly large amounts, temporarily increase blood volume and hence act as a strain on a weakened heart, and also that the late effect of glucose may be exactly the reverse of that desired, that is, water retention with increase of edema may occur. More-

over, it has been reported that intravenous sucrose may cause renal damage.⁵⁵

Of the drugs used as diuretics the most popular at present, and deservedly so, are the mercurials, of which merbaphen (Novasurol), mersalyl (Salyrgan) and Mercupurin are the best known. These should be given intravenously if possible, are tolerated intramuscularly, but cannot be administered subcutaneously. They are practically nontoxic. A rare case of intolerance to them may occur. I have seen but one case of renal irritation out of a great many thousand injections. If effective in a patient, they can be given repeatedly without harm. Many patients have had hundreds of injections over a period of years, at weekly or semi-weekly intervals. The dose is 1 to 2 cc.; larger doses are usually inadvisable. The exact mode of action of these drugs is still in dispute. A recent report⁵⁶ suggests that under certain circumstances the blood volume may be considerably increased prior to diuresis, and these authors therefore suggest, to avoid the possibility of undue strain on the heart, the administration of smaller doses (0.5 cc.) thrice daily.

The inconvenience of the intravenous injection of the mercurial diuretics has led to an attempt to find other routes of administration. Suppositories containing the drugs are available but, although often effective, have not proved entirely satisfactory because of the rectal irritation that often results. A recent report⁵⁷ of an effective oral preparation is promising, but further work is required before its value can be considered established.

Although the mercurial diuretics are on the whole the most effective and have received especial attention in the last few years, the xanthine group should not be forgotten. Although theophylline itself is the most potent of the xanthine group, its tendency to produce nausea has led to its use mainly in combination with other salts, such as theophylline sodium acetate, 5 to 10 gr. thrice daily, and theophylline ethylene diamine (Aminophylline), 1½ to 3 gr. thrice daily. The latter, however, is of greater clinical value when used as a bronchial dilator or vasodilator than as a diuretic. Theobromine, usually administered in combination with sodium salicylate (Diuretin), 40 to 60 gr. daily, is mild but well tolerated. More effective is theobromine calcium salicylate (Theocalcin), 20 to 40 gr. daily.

SUMMARY

A scheme has been presented for the evaluation of clinical edema in accordance with the underlying disturbance involved; the various causes

of edema and of certain disturbances of the electrolyte and water balance have been discussed; certain technical aids in the assessing of the nature of the edema have been considered; and its treatment has been described.

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REFERENCES

1. Sodeman, W. A. and Burch, G. E. The tissue pressure in subcutaneous edema. *Am. J. M. Sc.* 194:846-850, 1937.
2. Gamble, J. L. *Chemical Anatomy, Physiology and Pathology of Extra-cellular Fluid*. 94 pp. Boston: Harvard Medical School, 1939.
3. Peters, J. P. *Body Water. The exchange of fluids in man*. 405 pp. Springfield, Illinois: Charles C. Thomas, 1935.
4. Lewis, T. *The Blood Vessels of the Human Skin and Their Responses*. 322 pp. London: Shaw & Sons, Ltd., 1927.
5. Horton, B. T. and Brown, G. E. Systemic histamine-like reactions in allergy due to cold. *Am. J. M. Sc.* 178:191-202, 1929.
6. Horton, B. T., Brown, G. E. and Roth, G. M. Hypersensitivity to cold with local and systemic manifestations of histamine-like character. *J. A. M. A.* 107:1263-1269, 1936.
7. Roth, G. M. and Ryncarson, E. H. The use of histamine and histaminase in the treatment of allergic reaction to insulin. *Proc. Staff Meet., Mayo Clin.* 14:353-357, 1939.
8. Horton, B. T. The use of histamine in the treatment of specific types of headaches. *J. A. M. A.* 116:377-383, 1941.
9. Foshay, L. and Hagebusch, O. E. Histaminase in the treatment of serum sickness. *J. A. M. A.* 112:2398-2402, 1939.
10. Felix, J. Experimental and clinical investigations of the action of histaminase contained in extracts of the mucous membrane of the intestine on histamine. *Acta med. Scandinav.* 95:1-15, 1938.
11. Best, C. H. and McHenry, E. W. A note on histaminase. *J. A. M. A.* 115:235, 1940.
12. Ellis, L. B. and Weiss, S. Vasomotor disturbance and edema associated with cerebral hemiplegia. *Arch. Neurol. & Psychiat.* 36:362-372, 1936.
13. Weiss, S. and Wilkins, R. W. The nature of the cardiovascular disturbances in nutritional deficiency states (beriberi). *Ann. Int. Med.* 11:104-148, 1937.
14. Ellis, L. B. and Hall, F. C. Chronic hereditary edema (Milroy's disease): its clinical aspects and the nature of its production. *New Eng. J. Med.* 209:934-939, 1933.
15. Ellis, L. B. Plasma protein deficiency in patients with cardiac edema. *M. Clin. North America* 16:943-949, 1933.
16. Grabfield, G. P. The protein metabolism in Bright's disease. In *Medical Papers Dedicated to Dr. Henry A. Christian*. 1000 pp. Boston: privately published, 1936. Pp. 170-176.
17. Goetsch, E. and Reeves, F. B. Observations on the nature of serum proteins in nephrosis. *J. Clin. Investigation* 15:173-180, 1936.
18. Alving, A. S. and Mirsky, A. E. The nature of plasma and urinary proteins in nephrosis. *J. Clin. Investigation* 15:215-220, 1936.
19. Goetsch, E. and Lytle, J. D. Precipitin studies in nephrosis and nephritis. *J. Clin. Investigation* 19:9-24, 1940.
20. Luetscher, J. A., Jr. Electrophoretic analysis of plasma and urinary proteins. *J. Clin. Investigation* 19:313-320, 1940.
21. Foley, E. F., Keeton, R. W., Kendrick, A. B. and Darling, D. Alterations of serum proteins as an index of hepatic failure. *Arch. Int. Med.* 60:64-76, 1937.
22. Tumen, H. and Bockus, H. L. The clinical significance of serum proteins in hepatic diseases compared with other liver function tests. *Am. J. M. Sc.* 193:788-800, 1937.
23. Stewart, H. J. Mechanism of diuresis alterations in the specific gravity of the blood plasma with onset of diuresis in heart failure. *J. Clin. Investigation* 20:1-6, 1941.
24. Thorn, G. W., Engel, L. L. and Eisenberg, H. The effect of corticosterone and related compounds on the renal excretion of electrolytes. *J. Exper. Med.* 68:161-171, 1938.
25. Thorn, G. W. and Fror, W. M. Desoxycorticosterone acetate therapy in Addison's disease: clinical considerations. *J. A. M. A.* 114:2517-2525, 1940.
26. Loeb, R. F. Adrenal insufficiency. *Bull. New York Acad. Med.* 16:347-367, 1940.
27. Albright, F. personal communication.
28. Thorn, G. W., Nelson, K. R. and Thorn, D. W. A study of the mechanism of edema associated with menstruation. *Endocrinology* 22:155-163, 1938.
29. Thorn, G. W. and Emerson, K., Jr. The role of gonadal and adrenal cortical hormones in the production of edema. *Ann. Int. Med.* 14:757-769, 1940.
30. Thomas, W. A. Generalized edema occurring only at the menstrual period. *J. A. M. A.* 101:1126, 1933.
31. Atkinson, A. J. and Ivy, A. C. Menstrual edema: the report of a case controlled by emmenin but not by theelin or theelin. *J. A. M. A.* 106:515-517, 1936.
32. Greenhill, J. P. and Freed, S. C. The mechanism and treatment of premenstrual distress with ammonium chloride. *Endocrinology* 26:527-531, 1940.
33. Strauss, M. B. Toxemia of pregnancy types, etiology and treatment. *Am. J. Obst. & Gynec.* 38:199-213, 1939.
34. Weiss, S., Dexter, L., Parker, F., Jr. and Tenney, B., Jr. Arterial hypertension in pregnancy and the hypertensive toxemia syndrome of pregnancy (pre eclampsia and eclampsia). *Tr. A. Am. Physicians* 55:282-288, 1940.

- 34 Dörfler W. E. Section of the human hypophysis stalk: its relation to diabetes insipidus and hypophyseal functions. *J. A. M. A.* 114:312-314 1940
- 35 Biter C. P. The pituitary gland in relation to water exchange. *A. Research Nerv. & Ment. Dis. Proc.* 17:392-409 1938
- 36 Gersh L. Water metabolism, endocrine factors. *A. Research Nerv. & Ment. Dis. Proc.* 20:436-445 1940
- 37 Shapiro B. G. Control of the urinary secretion by the anterior pituitary. *Lancet* 2:1457-1460 1938
- 38 Byrom F. B. The nature of myxoedema. *Clin. Sci.* 1:273-285 1934
- 39 Joslin E. P., Root H. F., White P. and Marble A. *The Treatment of Diabetes Mellitus*. Seventh edition. 783 pp. Philadelphia: Lea & Febiger 1940. Pp. 246-248, 401-411
- 40 Jensen H. F. *Insulin: Its chemistry and physiology*. 252 pp. New York: Commonwealth Fund 1938. P. 146
- 41 Elsom L. O., Lewy F. H. and Hieblein G. W. Clinical studies of experimental human vitamin B complex deficiency. *Am. J. M. Sc.* 200:75-764 1940
- 42 Strauss M. B. and Fox H. J. Anemia and water retention. *Am. J. M. Sc.* 200:454-462 1940
- 43 Moore S. and Van Slyke D. D. The relationships between plasma specific gravity, plasma protein content and edema in nephrosis. *J. Clin. Investigation* 8:337-355 1930
- 44 Barbour H. G. and Hamilton W. P. The falling drop method for determining specific gravity. *J. Biol. Chem.* 69:625-640 1926
- 45 Hagan B. M. A simple method for the estimation of total protein content of plasma and serum. I. A falling drop method for the determination of specific gravity. *J. Clin. Investigation* 17:369-372 1938. II. The estimation of the total protein content of human plasma and serum by the use of the falling drop method. *Ibid.* 17:373-376 1938
- 46 Linderström-Lang K., Jacobsen O. and Johansen G. On the measurement of the deuterium content in mixtures of H_2O and D_2O . *Compt. rend. J. trav. du lab. Carlsberg. Series chem.* 23:1-24 1938
- 47 Moritz F. and v. Tabora D. Ueber eine methode bei menschen den Druck in oberflächlichen Venen exakt zu bestimmen. *Deutsche Arch. f. Klin. Med.* 93:475-505 1910
- 48 Lyons R. H., Kennedy J. A. and Burwell C. S. The measurement of venous pressure by the direct method. *Am. Heart J.* 16:675-693 1938
- 49 Elman R. and Weiner D. O. Intravenous alimentation with special reference to protein (amino acid) metabolism. *J. A. M. A.* 112:796-802 1939
- 50 Altshuler S. S., Hensel H. A. and Sahyun M. Maintenance of nitrogen equilibrium by amino acids administered parenterally. *Am. J. M. Sc.* 200:239-244 1940
- 51 Elman R. Therapeutic significance of plasma protein replacement in severe burns. *J. A. M. A.* 116:713-716 1941
- 52 Ham T. H. Transfusion therapy: a review of blood groups, transfusion accidents, hemolytic reactions, stored blood, transfusion methods and plasma and serum transfusions. *New Eng. J. Med.* 223:332-339 1940
- 53 Hill J. M., Muirhead E. E., Ashworth C. T. and Tigert W. D. The use of deproteinized plasma with particular reference to shock. *J. A. M. A.* 116:395-402 1941
- 54 Goodson A. Jr. and Binger M. W. Acacia in the treatment of the nephrotic syndrome. *Arch. Int. Med.* 66:1252-1281 1940. Treatment of nephrotic edema. *J. A. M. A.* 114:2515-2517 1940
- 55 Lindberg H. A., Wald M. H. and Barker M. H. Renal changes following administration of hypertonic solutions (50 per cent sucrose, 50 per cent sorbitol, 50 per cent dextrose and 10 per cent sodium chloride). *Arch. Int. Med.* 63:907-918 1939
- 56 Anderson W. A. D. and Betha W. R. Jr. Renal lesions following administration of hypertonic solutions of sucrose. *J. A. M. A.* 114:1983-1987 1940
- 57 Swigert V. W. and Fitz R. The effect of mersalyl (salysgan) on plasma volume. *J. A. M. A.* 115:1786-1790 1940
- 58 Batterman R. C., DeGraff A. C. and Rose O. A. Treatment of congestive heart failure with an orally administered mercurial diuretic. *Am. Heart J.* 21:98-103 1941

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27251*

PRESENTATION OF CASE

A two-year-and-nine-month-old boy was well until two months before entry, when he contracted what was considered to be pertussis. At the same time the siblings were said to have suffered from pertussis. For the first three weeks of his illness he was up and about, had a good appetite, but lost weight, and for the last month was so ill that he had to remain in bed. His temperature rose to 102°F. daily. Paroxysms of coughing continued, but the whoop disappeared. For the three days before entry, the cough was much worse, and hospitalization was advised.

The family and past histories were irrelevant.

Physical examination revealed an extremely emaciated boy without any subcutaneous fat and with marked loss of muscular tissue. He was quite pale and ill, with a severe, loose cough, producing moderate amounts of very foul purulent sputum without blood. He was dyspneic and slightly cyanotic. His skin was dry and rough, and there was a slight hyperkeratosis about the hair follicles. The eyes were normal; the ears and nose were normal. The abdomen was distended and tympanitic. The liver and spleen could not be felt. There was no tenderness or spasm. There was definite clubbing of the fingers and toes. There was a pronounced Harrison's groove, but no great enlargement of the costochondral junction. The heart was normal. The right lung was hyper-resonant, and breathing was greatly exaggerated. There were numerous loud adventitious sounds referred from the opposite side; there were no fine rales on the right. The left chest was dull to flat throughout, particularly over the left base and in the axilla. Breath sounds were diminished and replaced by numerous loud rales, rhonchi and bubbling sounds. Tactile and vocal fremitus were increased over the areas of dullness. There was amphoric breathing in the area of flatness in the left lower axilla.

The urine was normal. The blood showed a moderate secondary anemia, no leukocytosis and a normal differential count. A 1:1000 tuberculin

test was negative. Type 23 pneumococcus was isolated from the throat.

X-ray films of the chest revealed complete opacity on the left, with a suggestion of cavitation at the left base. The right lung showed a diffuse fine mottling consistent with, but not diagnostic of, tuberculosis. X-ray films of the long bones revealed osteoporosis.

From entry the patient was desperately ill, the fever remaining between 101 and 103°F. The cough was extremely severe, producing large amounts of foul sputum. Repeated examinations of the sputum for acid-fast bacilli were negative. The patient was given the usual supportive treatment, including two small transfusions of citrated blood and a transfusion of blood serum. He was placed in an oxygen tent the last few days of life. The patient's condition was too precarious to allow any further diagnostic or therapeutic measures, and he died six days after entry.

DIFFERENTIAL DIAGNOSIS

DR. DONALD KING: I have not yet seen the x-ray films, but wish to give you my preliminary reactions on reading the summary of the case. There are four points I shall make.

In the first place, it is obvious that the boy had a pulmonary abscess or multiple abscesses. In this clinic at the present time we are not using the term "gangrene of the lung," but I am sure that in many clinics a case like this, with high fever, very foul sputum, marked loss of weight and rapid progression to death, would be so classified.

My next point is concerned with the etiologic organism of this abscess. We are told that Type 23 pneumococcus was isolated from the throat and that no tubercle bacilli were found, but we are given no further bacteriologic data. I do not believe that Type 23 pneumococcus would give the abscess and foul sputum, and we have no reason to believe that a Friedländer bacillus or yeast or other fungus was present; hence we must assume, I believe, that the pulmonary abscess was caused by the group of anaerobic mouth organisms, including spirochetes, fusiform bacilli, vibrios and cocci. Just how these organisms found their way into this patient's lung and set up the infection is not clear.

Thirdly, what about the relation of whooping cough to lung abscess? We must assume that the boy had whooping cough, because he and his brothers and sister whooped. But lung abscess is a very rare complication of this infection. There is no mention of it in the literature, and in our series of 212 cases of pulmonary abscess, none were associated with pertussis. Of course, in bron-

*This case is presented through the courtesy of the Children's Hospital, Boston.

chiectasis the story is different Whooping cough is frequently given as the cause of this disease, and in our series of 400 cases 9 per cent were said to have followed pertussis Present opinion is that two factors are necessary for the production of bronchiectasis: bronchial obstruction, which may be partial or complete, and infection It has been suggested that in whooping cough enlarged mediastinal lymph nodes are responsible for partial bronchial obstruction I should like to get some help from the x-ray men and Dr. Farber regarding this point The textbooks do not help They talk about bronchitis and emphysema associated with whooping cough, but do not mention enlarged nodes

DR JAMES R LINGLEY: We see very few chest films of children with whooping cough However, our impression is that inflammatory lymph nodes, unless tuberculous, are rarely seen by x ray

DR KING: Then it is up to you, Dr Farber Do enlarged lymph nodes occur commonly with whooping cough, and is it possible that they give bronchial obstruction and therefore lead to bronchiectasis? And, in the case that we are considering, could enlarged nodes have been a possible factor in producing the pulmonary abscess?

DR SIDNEY FARBER: I should think not, in a case of uncomplicated pertussis

DR KING: Then neither the roentgenologist nor the pathologist can give any support to this theory.

Finally, what other causes were there for the abscess? In any child of two years and nine months with an abscess or persistent lung disease, one wonders about the inhalation of a foreign body, and we must consider this possibility, although we have no evidence for it Also we should think of congenital lung changes, possibly cystic, as a basis for later suppuration There is again no evidence in this case If this were an adult we should think of bronchial tumor, either benign or malignant, but such a diagnosis seems very unlikely in a child

We now come to the interpretation of the x-ray films, and the points in which I am interested are, first, whether the heart was displaced toward the left, giving evidence of atelectasis, or toward the right, making one suspect the presence of a large amount of fluid in the left pleural space; and secondly, what we are to do about the shadows in the right lung, which are interpreted as "fine mottling consistent with, but not diagnostic of, tuberculosis"

DR LINGLEY: The films show an extensive destructive process on the left side, with multiple

cavities; the diaphragm is slightly elevated on the left, and there is a slight displacement of the heart to the left The trachea likewise is a little displaced

DR KING: But no evidence of what one would consider real atelectasis or drowned lung, with bronchial obstruction?

DR LINGLEY: The collapse must have been of slight degree

DR KING: Do you want to help as to the presence of fluid?

DR LINGLEY: I think there is very little, if any, fluid.

DR KING: Certainly the story and physical findings seem to be against fluid.

DR LINGLEY: On the right side, there is mottling throughout the entire lung, a miliary process quite consistent with miliary tuberculosis.

DR KING: Of course, I am "on the spot" with this miliary lesion. Here is a child with a negative tuberculin test, using a 1:1000 dilution, and repeated negative smears for tubercle bacilli in the sputum. In an adult I should think of sarcoid disease, miliary carcinoma and possibly silicosis or yeast or fungus infection In this child, with such an x ray film, it is difficult to make any other diagnosis than tuberculosis in the right lung The negative tuberculin test could be explained because the child was moribund, and dying from overwhelming infection If the tuberculous process were primarily hematogenous and the process in the lung had not yet gone on to cavity formation, the sputum might still have been negative. I do not believe that pulmonary suppuration on the left side spreading to the right would give this roentgenologic picture Is that so, Dr. Lingley?

DR LINGLEY: Yes

DR KING: Everything considered, I should make the diagnosis of multiple pulmonary abscesses and miliary tuberculosis

DR TRACY B MALLORY: Are there any other suggestions or alternative diagnoses?

DR HAROLD L HIGGINS: I should think that the miliary process might come from plain bronchiectasis, it seems more or less localized

DR KING: It is diffuse from the top to the bottom of the right lung

DR MALLORY: Dr. Lingley, you do not know the answer, it may be fair to ask your opinion.

DR LINGLEY: Tuberculosis is my diagnosis

DR KING: All tuberculosis?

DR LINGLEY: Yes

DR KING: We have to have something more than tuberculosis to give foul sputum I do not believe tuberculosis by itself would give that.

DR. LINGLEY: The patient probably had secondary infection, but the main process, I believe, was tuberculous.

DR. KING: If it was tuberculosis, the patient might have had tuberculous nodes that gave bronchial obstruction.

CLINICAL DIAGNOSES

Pertussis, convalescent.

Bronchopneumonia, secondary (Type 23 pneumococcus).

Lung abscess, left lower lobe.

Chronic malnutrition, with multiple vitamin deficiencies.

Tuberculosis?

DR. KING'S DIAGNOSES

Multiple pulmonary abscesses.

Miliary tuberculosis.

ANATOMICAL DIAGNOSES

Pulmonary tuberculosis, with cavitation, left lower lobe.

Miliary tuberculosis.

Lung abscess, left lower lobe.

Bacteremia, terminal (Type 23 pneumococcus).

Acute bronchopneumonia, right (Type 23 pneumococcus).

Vitamin A deficiency.

Pertussis, convalescent (clinical history).

PATHOLOGICAL DISCUSSION

DR. FARBER*: I had to go back to 1935 to find a case of tuberculosis that did not have the diagnosis of tuberculosis stamped all over it.

This patient did have tuberculosis, and there were certain other findings. The child was very much emaciated, a finding not characteristic of tuberculosis in early life. There was a peculiar dryness of the skin, which was remarked on in the history and which was considered by those clinicians who saw the patient to be suggestive of a deficiency disease, the exact type of which was not mentioned. At autopsy we found some evidence of vitamin A deficiency, as shown by metaplasia of the lining epithelium of the trachea and bronchi, although no change was present in the ducts of the pancreas or the renal pelvis. The vitamin A levels, determined during life from the blood and at autopsy from the liver, were low.

In the lowermost portion of the left lung was an area of caseation, and the lymph glands on that side showed the classic spread of tuberculosis, the

characteristic picture of the lymph-node component of the primary lesion. In the right lung the picture was much more that of miliary tuberculosis, but that was not all. Here we also found massive acute pneumonia caused by a Type 23 pneumococcus, the organism recovered from the heart's blood at the time of autopsy. A deeper cut showed the cavity on the left, which Dr. King discussed and which was a mass of necrosis and caseation. Almost the entire lower lobe on the left was involved in the process. Whether a foreign body had been there, or aspiration of food had occurred into a small area of tuberculous infection, I cannot say from the findings at autopsy; it is highly probable, however, that some such factor must have been added to the tuberculous process to produce this kind of lesion and the type of sputum described.

A minimal number of lesions were found in other parts of the body. There were miliary tubercles in the liver, kidney, spleen, bone marrow and many other organs of the body. This type of spread is a hematogenous one. One section of the lung shows an area in which the process is breaking into a bronchus by direct extension and destruction of the bronchial wall. Another shows a much more characteristic type of Ghon lesion, with a small area of consolidation just beneath the pleura, surrounded by satellite tubercles, and with spread to the regional lymph nodes. There was a tuberculoma of the cerebellum—a lesion rarely seen at the present time. Still another rare lesion at autopsy was massive mesenteric lymphadenitis caused by the tubercle bacillus.

I might add just one point concerning the relation of pertussis to a lesion of this kind. Pertussis may accelerate the tuberculous lesion that has existed previously, as is well known, or may be responsible for aspiration of vomitus, food or foreign bodies during paroxysms and thus bring about secondary damage to the lungs, quite apart from the initial pathologic process. In pertussis, the uncomplicated disease is a superficial one involving the cilia of the upper respiratory tract. The major symptom is brought about by the presence of the organisms in the cilia, with interference with ciliary activity. The lymph nodes at the hilum of the lung become involved only when complications due to secondary invaders occur.

A PHYSICIAN: Do the enlarged nodes narrow the bronchus?

DR. FARBER: No; not to any important degree, except in cases of chronic bronchopneumonia.

DR. KING: We really have three conditions here—the abscess, the pneumococcal infection and the tuberculosis.

*Assistant professor of pathology, Harvard Medical School; pathologist, Children's Hospital, Boston.

CASE 27252

PRESENTATION OF CASE

First Admission. A sixty-nine-year-old construction worker entered the hospital complaining of severe frontal headaches of five weeks' duration.

One week before entry, the headache shifted to the temporal regions; it included first the left and then the right, and was accompanied by a sore throat, a fever of 102°F. and redness and swelling of the face to the point where both eyes were closed. Furthermore, there was exquisite tenderness of the left scalp.

On examination the left face was swollen, and the left scalp acutely tender. There were cardiac enlargement, aortic regurgitation and a Corrigan pulse. The blood pressure was 180 systolic, 70 diastolic. A rectal examination was said to have been negative. The white-cell count was 12,800; the blood Hinton reaction was positive, the spinal-fluid Wassermann reaction negative.

Within a few days, the facial swelling subsided somewhat, and an unusual prominence of both superficial temporal arteries was noticed. Although pulsation was not visible, it was palpable, albeit somewhat reduced, and tenderness was present along the main trunks and branches. Pressure on the carotid arteries relieved the headache. The temperature was found to rise regularly in the afternoon. A biopsy specimen was taken from one of the arteries, and histologic examination disclosed temporal arteritis. Three weeks after admission, the patient's symptoms had subsided spontaneously and he was discharged.

Second Admission (two months later). In the interval the patient had felt perfectly well except for slight constipation, which had been relieved by laxatives. Two days before admission, he noticed anorexia and began to pass large amounts of gas by mouth and rectum. Nothing further occurred until a few hours before entry and half an hour after a rather small, loose, bowel movement. At the time, the patient was bending over and was seized with a constant, sharp, crampy hypogastric pain accompanied by profound weakness and the passage of more gas by mouth and rectum. He lay down and applied a hot-water bottle to his abdomen, with some relief, but an hour later suffered a shaking chill, followed by fever and sweating. The patient's physician was called and recorded a temperature of 102.7°F. and soreness in the left lower quadrant; he advised immediate hospitalization. At the time of admission, the pain was more intense, arising in waves every five to ten minutes and breaking within twenty seconds; it seemed to originate in the left lower quadrant, shifting to the umbilical region and right lower

quadrant. Each time an attack occurred the patient had a desire to move his bowels and complained that it hurt to shift his legs. He denied nausea, vomiting and dizziness and said that he had gained weight since his last illness, when he had lost 40 pounds.

The additional physical findings were as follows: The patient appeared acutely ill. The blood pressure was 100 systolic, 40 diastolic. In the distended abdomen there was diffuse tenderness, most marked in the lower portion, and spasm was noted in the left lower quadrant. Peristalsis was hypoactive except during the attacks of pain. On rectal examination, a 3-cm. to 4-cm. cauliflower-like mass was palpable on the right anterior wall of the rectum, 9 cm. from the anal orifice; its surface bled freely.

The temperature was 102°F., the pulse 89, and the respirations 20.

The urine showed a + test for albumin. The blood showed a red-cell count of 4,600,000 with a hemoglobin of 75 per cent, and a white-cell count of 20,000. The nonprotein nitrogen of the blood serum was 29 mg. and the protein 6.5 gm. per 100 cc.; the chlorides were 105.2 milliequiv. and the carbon dioxide combining power 25.7 milliequiv. per liter. The stools were liquid, thick and gray black, and gave a ++++ guaiac reaction.

A flat abdominal x-ray film showed dilated, air-filled loops of small intestine, particularly on the left side. The colon was moderately dilated. A film of the chest taken with a portable machine was negative.

The patient was given a 500-cc. blood transfusion, and a Miller-Abbott tube was passed. During the next nine days he improved tremendously; feces and flatus passed per rectum, the abdominal distention subsided, the white-cell count dropped to 12,000, and the temperature fell. Gradually a tender mass, definitely not the one felt rectally, localized in the left lower quadrant. A proctoscopic examination two weeks after admission revealed a hard, movable, ulcerated lesion on the anterior rectal wall, 12 cm. from the anus. A biopsy of the mass showed adenocarcinoma, Grade II. Twelve days later an operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. JOHN D. STEWART: May we see the x-ray films?

DR. GEORGE W. HOLMES: The films of the chest show no evidence of metastasis to the lungs. They do show enlargement of the left side of the heart, with some tortuosity of the aorta. The position of the diaphragm is normal. This film was taken

to determine whether there was free air in the abdominal cavity, and there is no evidence of it. The next film shows moderately dilated loops of small bowel in the left upper quadrant, a rather characteristic picture of gas-filled, moderately dilated loops of jejunum. I do not want you to put too much weight on that statement. It may be ileum, but I think it is jejunum. Then, after the passage of the Miller-Abbott tube, the films show deflation and the disappearance of a large amount of gas in the intestinal tract. I do not see any evidence pointing to the nature of the obstruction.

DR. STEWART: It seems clear to me at the outset that this patient's abdominal pain was intestinal colic, and other causes of abdominal pain can therefore be passed over. Furthermore, it seems clear that the intestinal colic was due to obstruction and not to other causes such as enterocolitis or food poisoning.

The causes of acute intestinal obstruction may be divided into three general groups, the neurogenic, the mechanical and the vascular. In this case, the neurogenic causes can be eliminated at once, in my opinion, because of the severe crampy abdominal pains, the bloody diarrhea and the development of spasm and tenderness in the left lower quadrant. Then, if the obstruction was either mechanical or vascular in origin, did strangulation enter the picture? The manifestations of acute mechanical intestinal obstruction vary, depending on the extent of interference with the blood supply to the bowel. There is some reason in this particular case to suspect strangulation: the decline in blood pressure, the rapid onset of severe pain, the development of localized tenderness and spasm and, subsequently, the development of a mass in the left lower quadrant, all of which are consistent with a process interfering with the blood supply to the bowel. However, the same findings also fit with an interference with bowel function coming from a primary vascular accident. As Dr. Holmes pointed out, there are dilated loops of small intestine. There is also gas in the large intestine. That, to my mind,—since this patient was not given an enema, in which way air may be injected into the colon,—suggests an incomplete obstruction to the lumen of the bowel, probably in the small intestine rather than in the large. I might say at this point that I do not believe that the carcinoma of the rectum, which the patient had, contributed to the symptoms that brought him into the hospital at the second admission. If we conclude that there is evidence of strangulation and of incomplete obstruction to the lumen of the bowel, a fair diagnosis to make is a primary vascular accident of some sort, either

embolic or thrombotic. As to what the primary lesion was in the vascular system we can only speculate. There was a possible source of emboli in the aortic lesion that this man had, and perhaps in the arteriosclerotic lesions that he probably had.

At this point we turn to a consideration of the episode that brought him into the hospital the first time. This was apparently a very bizarre picture, the exact nature of which I cannot make out. There were protracted headache and an illness associated with the loss of 40 pounds in weight; the culminating symptoms were fever, sore throat and swelling of the face, the description of which sounds like a cellulitis of the face; there was spontaneous subsidence of the evidence of infection and localization of the process in the temporal arteries, and the diagnosis of temporal arteritis was made by biopsy. Whether the general infectious process involving the arteries was syphilitic in type, whether it was nonspecific, whether it was due to a streptococcus or to some other bizarre lesion such as periarteritis nodosa, I do not see how we can say. However, I am inclined to explain the abdominal symptomatology on the same basis. If we do that, we are brought to a diagnosis of acute intestinal obstruction caused by intestinal infarction based on primary arterial disease. In addition, we know that the patient had carcinoma of the rectum. He probably had syphilis, and he had aortic regurgitation, myocarditis and hypertension.

This patient's course in the hospital bore out the judgment of those who had charge of the case. It is fair to say, however, that the evidence presented to us in the text makes it hard to see why they withheld operation at the time of admission to the hospital the second time. As a rule, early cases of acute intestinal obstruction are treated by fluid therapy, transfusion and operation, particularly when there is evidence that suggests strangulation, as in this case.

We are left to explain the mass in the left lower quadrant. If we make a diagnosis of intestinal infarction, we must assume that the mass was an infarcted, devitalized loop of intestine or a perforated loop with abscess. An unusual feature of this man's symptomatology at the second admission was the absence of vomiting. Usually, when there has been such a severe acute disturbance of bowel function, there is vomiting in connection with the cramplike pain. A diagnosis of intestinal infarction takes one "way out on a limb," but it seems to me that that is the most probable diagnosis in this particular case. The possibility that the patient had a lesion such as intussusception of the sigmoid, possibly in relation to a polyp, must be

considered, but I dismiss that from the diagnostic possibilities in my own mind

DR TRACY B MALLORY Dr Stewart has brought out clearly the fact that this is a complicated case, the symptomatology of which certainly cannot be explained by the presence of carcinoma of the rectum, which we know the patient had

DR F DENNETTE ADAMS Would Dr Stewart consider the possibility of a diverticulum above the cancer, with rupture at the time that the episode occurred?

DR STEWART I did consider that in going over the case. There were premonitory symptoms of two days' duration before the onset of the acute abdominal pain. Furthermore, an elevation of temperature at the time of the onset of abdominal pain suggests some general process or some inflammatory process apart from the acute lesion, but I do not see how we can make that diagnosis any more definite. I should be a little surprised to find that the patient had gas in the small intestine if the obstruction originated in the sigmoid, but I suppose it is a possibility.

CLINICAL DIAGNOSES

Carcinoma of the rectum
Diverticulitis?
Ulcerative colitis?

DR STEWART'S DIAGNOSES

Acute obstruction of the small intestine, due to infarction
Carcinoma of the rectum
Aortic regurgitation and chronic myocarditis
Serologic syphilis

ANATOMICAL DIAGNOSES

Diverticulitis of the sigmoid
Carcinoma of the rectum
Temporal arteritis

PATHOLOGICAL DISCUSSION

DR MALLORY So-called "temporal arteritis" is still a quite mysterious lesion. It is usually seen in people beyond the age of fifty, is generally bilateral and generally clears up spontaneously after varying lengths of time, and the histologic picture is rather characteristic. In the wall of the blood vessel, usually in the media, one finds con-

siderable numbers of foreign body giant cells, but to me the lesion does not look like periarteritis nodosa. It affects larger vessels than periarteritis nodosa usually does. It is a little more similar in appearance to the acute stage of Buerger's disease but again varies somewhat from that, and its uniform appearance in elderly people is very much against Buerger's disease. Whether patients suffering from temporal arteritis have similar vascular lesions elsewhere in the body is still unknown. I am not aware of any absolutely proved example, but it seems probable that they may occur.

DR EDWARD F BLAND The Mayo Clinic¹ reported about a dozen cases, and as I recall there was no direct relation to syphilis in any of these, either histologically or clinically. In one case a radial artery was also suspected of being involved at the same time, but this was not definitely established. Dr Adams had a patient here last year with this condition of temporal arteritis; I saw another patient last year, and one was reported at the Boston City Hospital² two years ago. They all followed the same clinical course and recovered after a period of months.

DR MALLORY In one case from which we had a biopsy specimen, the patient turned up later with intermittent claudication in the legs, but it was never possible to establish a diagnosis as to the vessels of the leg.

DR RICHARD H SWEET At operation it was discovered, of course, that the small bowel obstruction had disappeared. We noted that the tender mass was an area of diverticulitis of the sigmoid above and entirely separate from the cancer. The sigmoidal diverticulitis had perforated, and a thick inflammatory mass was adherent to the bladder. We did not see any evidence of fecal contamination. We therefore made a localized excision of that area with a proximal colostomy, brought the lower end below the sigmoidal lesion out in the lower portion of the wound,—somewhat as one does in the first stage of a Lahey excision of the rectum in two stages,—and left the rectal carcinoma to be dealt with later.

REFERENCES

- 1 Horton B T and Magall T B Arteritis of the temporal vessels: report of seven cases. *Proc Staff Meet. Mayo Clin* 12:548-553 1937
- 2 Jeghers H A case of temporal arteritis. *Proceedings of the New England Heart Association* Boston March 25 1940 P 39

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Established in 1828

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BIOPSY IN TUMOR DIAGNOSIS

SINCE the choice of surgery or radiation in the therapy of tumors hinges largely on an exact knowledge of the type of neoplastic cell present, biopsy is essential, even when one is reasonably sure that a tumor rather than another type of lesion is involved.

If the tumor is easily reached, incisional biopsy is usually simple and best suited to supply material for accurate diagnosis. Not always, however, is the tumor accessible; when it is deeply seated, one may resort to the aspiration of tumor cells or bits of tissue, and various methods have been suggested. One of the most satisfactory is that described in a paper in the present issue of the *Journal*. The procedure is one that traumatizes tissue but little and is fairly simple to carry out.

All methods of aspiration biopsy have certain inherent difficulties. Sometimes it is difficult to tell whether the tumor itself and not adjacent tissue has been removed. Furthermore, since the diagnosis of the pathologist frequently depends not only on the types of cells but also on the relation of tissues, a clear idea of general structure and tissue relation can be obtained only with difficulty from small amounts of tissue. This disadvantage is particularly great in cases of tumors of the breast or of the bone. Pathological diagnosis based on tissue removed by aspiration of various types should be guarded, and the findings should be weighed carefully with the clinical and roentgenographic evidence.

THE PROBLEM OF THE THREE EDWARD WARRENS

WHEN three men, all living at the same time, and all making distinct contributions to American medical literature, have the same name, without middle initials, the bibliographic confusion a hundred years later is not inconsiderable. When one, moreover, is closely associated with the ether controversy, another writes concerning the life of the man who, next to Morton, played the leading role in the ether demonstration in 1846 and a third became an Egyptian *Bey*, the demand becomes insistent to identify the individuals and their works. The problem, in part, was solved correctly four decades ago in the Army Medical Library; nevertheless, such are the vagaries of mind and the unreliability of man that the same institution now falls into error, and the world of bibliography must be again set right. To do so, however, is not by any means easy. Of one Edward Warren we know much, of another a moderate amount, but of the third, who gives the most difficulty, we know scarcely anything.

The easiest problem concerns the Edward Warren (1828-1893), *Bey*, a romantic Virginian, one of the most bizarre figures in the annals of American medicine, whose life has been well summarized by Howard A. Kelly in the *Dictionary of American Medical Biography* (1928). Born in 1828, in North Carolina, he became, in order, a country

doctor, a medical editor, a professor of surgery, a medical inspector of the confederate states during the Civil War, the chief surgeon of the general staff of Ismail Pasha in Egypt, a practitioner in Paris and a chevalier of the Legion of Honor. After a life on three continents he settled in Paris, and died there in 1893. An account of his unusual adventures is told in his book, *A Doctor's Experiences in Three Continents* (Baltimore, 1885), which consists of a series of letters to his friend, Dr John Morris, of Baltimore. Known as Edward Warren, *Bey*, he is easily identified and correctly referred to in the first series of the *Index-Catalogue*. Unfortunately, he is confused with another Edward Warren in the third series of the same great catalogue. His picturesque career, unique in American medicine, and based on his work in the swamps of Carolina, on the shores of the Chesapeake, on the borders of the Nile and in the quarters of the Seine, has been thoroughly depicted in numerous biographical sketches of the man. The *Bey* was not a contributor to the literature of the ether controversy, nor was he related, except possibly distantly, to the Warren family of Boston.

The other two Warrens with the given name of Edward were both Warrens of New England. The better known was Edward Warren (1804-1878), younger brother of the John Collins Warren (1778-1856) who performed the ether operation at the Massachusetts General Hospital on October 16, 1846. His well-known *Life of John Collins Warren* (Boston, 1860) was published in two volumes. He also wrote a biography of his father, *Life of John Warren, M.D.* (Boston, 1874). The reference to this book is the one incorrectly given in the third series of the *Index-Catalogue*. This Edward Warren graduated from Harvard College in 1826 and the Harvard Medical School in 1829, won the Boylston Prize in 1838 and in 1839 and, as noted above, wrote two important biographies. He was not a member of the Massachusetts General Hospital staff in 1846, and although forty two years old at the time, there is no record of his being in the hospital on October 16 of that year. He took no part in the

ether controversy, although he wrote an admirable account of it a decade later in the biography of his elder brother. This Edward Warren is most often confused with Edward Warren, *Bey*.

The identity of the third Edward Warren forms the real problem. His name stands out clearly on an important and rare ether pamphlet, *Some Account of the Letheon; or, Who Was the Discoverer?* (Boston, 1847). A second and a third edition, with a slight change in the title, were also issued in 1847. This publication by Warren must not be confused with the pamphlet by W. T. G. Morton, *Circular, Morton's Letheon* (Boston, 1846), five editions of which were issued in 1846 and 1847, this being Osler's first anesthesia item in his "Bibliotheca Prima," published in *Bibliotheca Osleriana* (Oxford, 1929). The Warren pamphlet was issued by Edward Warren, Morton's business associate and, according to Ford, a nephew of John Collins Warren. He came from Palmyra, Maine, and was closely associated with Morton during the early days of ether anesthesia. He is the same Edward Warren who contributed to the April 28, 1847, issue of the *Boston Medical and Surgical Journal* a note, "The Letheon and Dr. Wells" and to the May 19, 1847, issue a letter, 'Ethereal Inhalation.' Dr. Wells's claims as discoverer." The first of these two notes aroused the interest of Edward Warren, the physician and brother of John Collins Warren, who in a letter in the July 21, 1847, issue of the *Boston Medical and Surgical Journal* stated that he was not the author of the article, but that it was written by "a non-medical gentleman connected in this business with Mr. Morton." Dr. Warren, moreover, stated that his sympathies were entirely with Dr. Jackson, thus at that time differing from his older brother, the surgeon at the first operation.

This "non medical gentleman" was referred to as 'Mr Morton's agent,' an epithet he vehemently protested against in the July 28, 1847, issue of the *Boston Medical and Surgical Journal*. Little more is known of this third Edward Warren, not a physician in 1846, but whose name is so intimately associated with that of Morton. We can at least dissociate him from the *Bey* and from the

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THE PROBLEM OF THE THREE EDWARD WARRENS

WHEN three men, all living at the same time, and all making distinct contributions to American medical literature, have the same name, without middle initials, the bibliographic confusion a hundred years later is not inconsiderable. When one, moreover, is closely associated with the ether controversy, another writes concerning the life of the man who, next to Morton, played the leading role in the ether demonstration in 1846 and a third became an Egyptian *Bey*, the demand becomes insistent to identify the individuals and their works. The problem, in part, was solved correctly four decades ago in the Army Medical Library; nevertheless, such are the vagaries of mind and the unreliability of man that the same institution now falls into error, and the world of bibliography must be again set right. To do so, however, is not by any means easy. Of one Edward Warren we know much, of another a moderate amount, but of the third, who gives the most difficulty, we know scarcely anything.

The easiest problem concerns the Edward Warren (1828-1893), *Bey*, a romantic Virginian, one of the most bizarre figures in the annals of American medicine, whose life has been well summarized by Howard A. Kelly in the *Dictionary of American Medical Biography* (1928). Born in 1828, in North Carolina, he became, in order, a country

monest cause of death so soon after delivery is hemorrhage into the peritoneal cavity from rupture of the uterus, with subsequent shock.

It is reported that in this case one ampule of pituitary extract was given after the bag had been introduced. This is very poor obstetrics. Minimum doses repeated at regular intervals can do no harm, but an ampule at any time during labor before the baby and placenta are delivered is not advisable.

DEATH

OSBORNE—EDWARD D. OSBORNE, M.D., of New Bedford, died May 19. He received his degree from Howard University College of Medicine in 1907. He was a member of the Massachusetts Medical Society and the American Medical Association.

His sister survives him.

MISCELLANY

TUBERCULOSIS IN MENTAL HOSPITALS

Dust swept under the sofa disturbs no one—until it is discovered, nor does tuberculosis hidden from public view. It is well to be reminded that more than 5 per cent of the people who die of tuberculosis annually in the United States are in mental hospitals. Scant attention has been paid to this sector of the problem for which reason an article on tuberculosis in mental hospitals (Pollak, M., Hummel, A. V., and Turov, I. L. Tuberculosis in mental hospitals. *Am Rev Tuberc* 43:373-387, 1941) commands the attention of health workers, hospital authorities and physicians. An abstract of the article follows.

The Peoria (Illinois) State Hospital with an average daily census of 2575 patients, has had a tuberculosis revision since 1905. X-ray examination of the 56 patients assigned to it showed that 16 per cent had no tuberculosis. Thus, of the resident patients in the hospital at the beginning of the survey, only 47 (187 per cent) were known to have tuberculosis.

From the beginning of the survey it was obligatory to take a chest roentgenogram on all patients who were transferred to the infirmaries irrespective of whether tuberculosis was suspected or not. In the course of the study there were surveyed 2156 patients in residence: 766 newly admitted patients and 477 employees. Tuberculin tests of these groups (all but about 4 per cent were tested with tuberculin) showed positive reactions in 94.6 per cent of resident patients, 80.6 per cent of receiving ward patients and 57.3 per cent of the employees. Parenchymal lesions were revealed by x-ray examination in 11.2 per cent of resident patients, 7.4 per cent of receiving ward patients and 1.6 per cent of employees. The majority of the resident patients and less than half the receiving ward patients were over fifty years old. The great majority of employees were under fifty years of age.

The percentage of the tuberculous increased with the length of stay of the patients. Of the tuberculous employees, one half developed the disease after five years of service.

About 10 per cent of the tuberculous patients in the receiving wards were committed from tuberculosis sanatoriums and about 14 per cent were known to have tuberculosis at the time of admission. The remaining cases were discovered in the course of the survey.

This study bears out what has been found in other

studies namely that when the physical examination alone is depended on, tuberculosis is at times diagnosed when it does not exist and overlooked at others even in the terminal stage. One investigator found that 38 per cent of the patients on the tuberculosis wards had no tuberculosis. In another hospital for mental diseases, 2 undiagnosed cases were found in 50 autopsies.

The different infection rates in the three groups can be attributed to the different age groups, and the high percentage of positive reactors among the resident patients chiefly to advanced age. It should be considered also that patients in this study come largely from the low income group in which infection and morbidity rates are known to be high.

The significant difference in the percentage of tuberculosis among resident (11.2 per cent) and receiving ward (5.7 per cent) patients indicates that many of the patients develop tuberculosis while they reside in the institution.

The rationale of spending money on tuberculosis prevention among the psychotics, who already represent a tremendous burden on society, was seriously questioned by some authorities in the course of our study. The fact, however, that 6.9 per cent of our tuberculous patients have already been discharged or paroled by January 1, 1940 shows that some of these patients have an opportunity to spread their disease in their own family and community after they return home. The possibility of the spread of the disease from these patients to the employees has also to be considered seriously. For these reasons, the money spent on tuberculosis prevention must be considered as a prudent investment on the part of hospital authorities.

The treatment of the tuberculous psychotic differs in no way from that of the mentally normal, namely, rest. The chief aim of treatment is to produce a negative sputum, and, therefore, collapse therapy is used even if the patient's mental condition seems to be entirely hopeless. Patients under shock therapy deserve special consideration—3.2 per cent of such patients developed tuberculosis either during the course or after the treatment. Patients should be x-rayed immediately before undergoing shock therapy and frequently thereafter.

Should tuberculous psychotics be centralized in one institution? The disadvantage (from the state's standpoint) is that the transportation of patients is costly and that it entails a hardship when the family of a patient has to travel a long distance. Under decentralization each hospital has to have on its staff at least one physician who is well trained in psychiatry as well as phthisiotherapy. The training of such physicians promises worthwhile contributions to the psychiatric as well as to the tuberculosis field.

The author's conclusions are as follows:

Tuberculosis is a problem of first order in every mental institution.

Patients suffering from tuberculosis are admitted to these institutions in a fairly large percentage without being so diagnosed. In addition to these, a relatively large percentage of patients develop tuberculosis while in residence again without their disease being recognized.

Owing to the contagious nature of tuberculosis mental institutions should develop a definite and systematic tuberculosis-control program employing the tuberculin test and x-ray study in diagnosis. These examinations should be conducted on all newly ad-

mitted patients immediately after admission and on the resident patients at least once annually.

Collapse therapy should be fully utilized in the treatment of the tuberculous psychotic, irrespective of the patient's mental deterioration.

Patients selected for shock therapy should be x-rayed before treatment is begun and re-rayed at frequent intervals during and after such treatment.

Employees coming in close contact with the patients should be x-rayed every three months, and the tuberculin reactors among the other personnel at least once annually. — Reprinted from *Tuberculosis Abstracts* (June, 1941).

RÉSUMÉ OF COMMUNICABLE DISEASES IN MASSACHUSETTS FOR APRIL, 1941

DISEASES	MARCH 1941	APRIL 1940	FIVE YEAR AVERAGE*
Anterior poliomyelitis	1	0	0
Chicken pox	1181	1286	1139
Diphtheria	16	11	14
Dog bite	1314	907	937
Dysentery, bacillary	1	24	9
German measles	522	56	211
Gonorrhea	315	268	412
Lobar pneumonia	391	521	573
Measles	4018	2463	3303
Meningococcus meningitis	8	5	15
Mumps	1492	756	1106
Paratyphoid B fever	6	3	9
Scarlet fever	877	756	1111
Syphilis	419	479	498
Tuberculosis, pulmonary	267	189	298
Tuberculosis, other forms	29	19	32
Typhoid fever	2	10	5
Undulant fever	13	4	3
Whooping cough	807	625	726

*Based on figures for preceding five years

RARE DISEASES

Anterior poliomyelitis was reported from: Pittsfield, 1; total, 1.

Diphtheria was reported from: Fall River, 1; Foxboro, 1; Northbridge, 1; Saugus, 3; Springfield, 4; Tyngsboro, 1; Waltham, 2; West Springfield, 1; Worcester, 1; total, 15.

Dysentery, amebic, was reported from: Worcester, 1; total, 1.

Dysentery, bacillary, was reported from: Framingham, 1; total, 1.

Infectious encephalitis was reported from: Dedham, 1; Scituate, 1; Winthrop, 1; total, 3.

Malaria was reported from: Fort Banks, 1; total, 1.

Meningococcus meningitis was reported from: Boston, 1; Camp Edwards, 1; Milton, 1; Springfield, 1; Wareham, 1; Worcester, 3; total, 8.

Paratyphoid B fever was reported from: Haverhill, 1; Malden, 3; Salem, 2; total, 6.

Pellagra was reported from: Winchendon, 1; total, 1.

Pfeiffer bacillus meningitis was reported from: Framingham, 1; total, 1.

Septic sore throat was reported from: Andover, 1; Beverly, 3; Boston, 10; Fall River, 4; Framingham, 1; Hanson, 2; Lynn, 1; Milton, 1; total, 23.

Tetanus was reported from: Swampscott, 1; total, 1.

Trachoma was reported from: Boston, 1; Lynn, 1; total, 2.

Typhoid fever was reported from: Chelsea, 1; New Bedford, 1; total, 2.

Typhus fever was reported from: Chelmsford, 1; total, 1.

Undulant fever was reported from: Acton, 1; Adams, 1; Amherst, 1; Leominster, 6; Lowell, 1; Littleton, 1; Montague, 1; Walpole, 1; total, 13.

The second case of anterior poliomyelitis for the year was reported in April.

Chicken pox, diphtheria and whooping cough were reported slightly above the five-year averages.

Dog bite, which has been increasing steadily since January, showed a record high figure for this month.

Bacillary dysentery showed low incidence.

Lobar pneumonia was reported at the lowest figure since the corresponding month in 1933.

Mumps and German measles were reported highest in any month since 1936.

Measles, which has been climbing steadily since October, was reported still above the five-year average.

Meningococcus meningitis, typhoid fever, paratyphoid B fever, tuberculosis (pulmonary), and tuberculosis (other forms) were reported below the five-year averages.

Undulant fever showed an all-time record high figure for any one month.

Scarlet fever, which has been climbing since August, was reported below the five-year average.

NOTICES

ANNOUNCEMENT

DR. ROBERT L. MASON announces the removal of his office from 12 Bay State Road, Boston, to 75 Bay State Road, Boston.

MASSACHUSETTS DEPARTMENT OF CIVIL SERVICE AND REGISTRATION

Medical Inspector, School Department,
\$500 a Year, Westfield

Director of State Civil Service, Ulysses J. Lupien, has announced that competitive examinations are to be held on July 22 to find eligibles for appointment to the position of medical inspector, School Department, Westfield.

The entrance requirement is as follows: applicants must be registered physicians under the Massachusetts Board of Registration in Medicine. The subjects and weights of the examination are as follows: training and experience, 2; practical questions, 3; total, 5. Applicants must obtain a grade of 70 per cent in each subject in order to become eligible. The last date for filing applications is Tuesday, July 1, at 5 p.m.

MASSACHUSETTS DEPARTMENT OF CIVIL SERVICE AND REGISTRATION

School Physician, School Department,
\$1000 a Year, Leominster

Director of State Civil Service, Ulysses J. Lupien, has recently announced that a competitive examination is to be held on July 25 in order to find eligibles for appointment to the position of school physician, School Department, Leominster.

The entrance requirement is as follows: applicants must be registered physicians under the Massachusetts Board of Registration in Medicine. The subjects and weights of the examination are as follows: training and experience, 2; practical questions, 3; total, 5. Applicants must obtain a grade of 70 per cent in each subject in order to become eligible. The last date for filing applications is Monday, July 7, at 5 p.m.

AMERICAN BOARD OF OBSTETRICS AND GYNECOLOGY

The next written examination and review of case histories (Part I) for Group B candidates will be held in various cities of the United States and Canada on Saturday, January 3, 1942, at 2:00 p.m. Candidates who successfully complete the Part I examinations proceed automatically to the Part II examinations held later in the year. Applications for admission to Group B, Part I, examinations must be on file in the secretary's office not later than October 6, 1941. Applications for Group A must be in the secretary's office by March 1, 1942.

The general oral and pathological examinations (Part II) for all candidates (Groups A and B) will be conducted by the entire board, meeting at Atlantic City, New Jersey, immediately prior to the 1942 meeting of the American Medical Association.

As previously announced in the board booklet, this fiscal year (1941-1942) of the board marks the close of the two groups of classification of applicants for examination. Thereafter, the board will have only one classification of candidates, and all will be required to take the Part I and Part II examinations. For further information and application blanks, address Dr. Paul Titus, secretary, 1015 Highland Building, Pittsburgh (6), Pennsylvania.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, JUNE 22

MONDAY JUNE 22
12:15-1:15 p.m. Clinicopathological conference Peter Bent Brigham Hospital amphitheater

TUESDAY JUNE 23
1:15-1:45 p.m. Clinicoradiological conference Peter Bent Brigham Hospital amphitheater

WEDNESDAY JUNE 25
12 m Clinicopathological conference Children's Hospital
*Open to the medical profession

JUNE 22-24 — Maine Medical Association Marshall House York Harbor Maine

SEPTEMBER 1-5 — American Congress of Physical Therapy Page 997
Issue of June 5

SEPTEMBER 1-5 — American Occupational Therapy Association The Mayflower Washington D.C.

OCTOBER 13-24 — 1941 Graduate Forfeiture of the New York Academy of Medicine, Page 834 Issue of May 8

OCTOBER 14-17 — American Public Health Association Page 579 Issue of March 27

JANUARY 3 1942 — American Board of Obstetrics and Gynecology Notice above

APRIL 20-24 — American College of Physicians Page 996 Issue of June 5

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

The Story of Clinical Pulmonary Tuberculosis By Lawson Brown, M.D. 8", cloth, 411 pp., with 1 portrait. Baltimore: Williams and Wilkins Company, 1941. \$2.75

A Manual of Allergy for General Practitioners By Milton B. Cohen, M.D., director of the Asthma, Hay Fever and Allergy Foundation, visiting physician in allergy, St. Alexis Hospital, Cleveland, Ohio. 12", cloth, 156 pp. New York: Paul B. Hoeber, Incorporated, 1941. \$2.00

Arthritis and Allied Conditions By Bernard I. Comroe, A.B., M.D., instructor in medicine, University of Pennsylvania, senior ward physician, Hospital of the University of Pennsylvania. Second edition, thoroughly revised. 9", cloth, 878 pp., with 242 illustrations. Philadelphia: Lea and Febiger, 1941. \$9.00

A Textbook of Dietetics By L. S. P. Davidson, B.A. (Cantab.), M.D. (Edin.), FRCP (Edin and Lond.), FRSE, professor of medicine and clinical medicine in the University of Edinburgh and physician to the Royal Infirmary, Edinburgh, and Ian A. Anderson, M.B., Ch.B. (Aberd.), clinical tutor and assistant in the metabolic wards, the Royal Infirmary, Aberdeen. With diet sheets constructed by Miss Mary E. Thomson, S.R.N., sister dietitian to the Royal Infirmary, Aberdeen, and a foreword by Sir John Boyd Orr, M.D., D.Sc., LL.D., F.R.S., director, Rowett Institute for Research in Animal Nutrition, Aberdeen. 8", cloth, 324 pp., with 27 tables. New York: Paul B. Hoeber, Incorporated, 1941. \$4.25

Scabies—Civil and Military Its prevalence, prevention and treatment By Reuben Friedman, M.D., assistant professor of dermatology and syphilology, Temple University School of Medicine, Philadelphia. 8", cloth, 288 pp. New York: Froben Press, 1941. \$3.00

Brucellosis (Undulant Fever) Clinical and tuberculous By Harold J. Harris, M.D., health officer, Westport, New York, consulting physician St. Lawrence State Hospital, and attending physician, Elizabethtown Community Hospital. With a foreword by Walter M. Simpson, M.D., director, Kettering Institute for Medical Research, Miami Valley Hospital, Dayton, Ohio. 8", cloth, 286 pp., with 12 colored and 44 black-and-white illustrations. New York: Paul B. Hoeber, Incorporated, 1941. \$5.50

The Medical Aspect of Boring By Ernst Jokl, M.D., head of Department of Physical Education, Witwatersrand Technical College, Johannesburg, South Africa, consultant Medical Aspect of Physical Education, South Africa Defense Force. 8", cloth, 251 pp., with 55 illustrations and 4 plates. Pretoria, South Africa: J. L. Van Schaik, Limited, 1941.

Medical Diagnosis and Symptomatology By Samuel A. Loewenberg, M.D., clinical professor of medicine, Jefferson Medical College, assistant physician, Jefferson Hospital, consulting physician, Philadelphia Hospital for Contagious Diseases and Philadelphia Psychiatric Hospital, and visiting physician, Philadelphia General Hospital and Northern Liberties Hospital. Fifth edition, entirely revised and reset. 4", cloth, 1139 pp., with 520 illustrations. Philadelphia: F. A. Davis Company, 1941. \$12.00

The Doctor Takes a Holiday An autobiographical fragment By Mary McKibbin Harper, M.D. 8", cloth, 349 pp., with 17 illustrations. Cedar Rapids, Iowa: The Torch Press, 1941. \$2.50

Medicine No. 4 in the series Vocational and Professional Monographs By Dwight O'Hara, M.D., professor of preventive medicine and assistant dean, Tufts College Medical School, Boston. 8", paper, 27 pp. Boston: Bellman Publishing Company, Incorporated, 1941. 50c.

Oral Pathology: A histological, roentgenological and clinical study of the diseases of the teeth, jaws and mouth. By Kurt H. Thoma, D.M.D., professor of oral surgery and Charles A. Brackett Professor of Oral Pathology, Harvard University. 4°, cloth, 1306 pp., with 1370 illustrations, including 137 in color. St. Louis: The C. V. Mosby Company, 1941. \$15.00.

The Medical Clinics of North America: New York number, May, 1941. Vol. 25, No. 3. 8°, cloth, 265 pp. Philadelphia: W. B. Saunders Company, 1941. \$3.00.

Mary Fletcher Comes Back: A brief account of the history, progress and future of Vermont's first general hospital. 4°, cloth, 68 pp., with 37 illustrations. Burlington, Vermont: published for the Board of Directors of The Mary Fletcher Hospital, 1941.

Über die Bedeutung der Röntgenuntersuchung für die Kardiologie: Speziell mit Rücksicht auf die Bedeutung der Herzvergrößerung. By Torfinn Denstad. 8°, paper, 80 pp., with 16 illustrations, and 19 tables. Stockholm: P. A. Norstedt und Söner, 1941. Sw. Cr. 8.

BOOK REVIEWS

Manual of the International List of Causes of Death. Based on the fifth decennial revision by the International Commission, Paris, October 3-7, 1938. *Manual of Joint Causes of Death.* Fourth edition, 1939. Prepared under the supervision of Halbert L. Dunn, M.D. 8°, cloth, 452 pp. Washington: United States Government Printing Office, 1940. \$1.25.

These two new editions of standard works, published as a unit, should be of interest to all those engaged in the classification of diseases and in biologic research.

Chemistry and Medicine: Papers presented at the fiftieth anniversary of the founding of the Medical School of the University of Minnesota. Edited by Maurice B. Visscher. 8°, cloth, 296 pp., with 76 figures and 19 tables. Minneapolis: The University of Minnesota Press, 1940. \$4.50.

In formulating an appropriate program for the commemoration of the fiftieth anniversary of the University of Minnesota Medical School, it was decided to focus the scientific program on chemistry as it is related to medicine. The papers thus presented were of such excellence that they were published under the direction of Dr. Maurice Visscher. Fourteen papers, embracing such fields as the application of physical chemistry to medicine, recent investigations in metabolism, aspects of immunity and chemotherapy, and certain approaches to the nervous control of the organism, and including such subjects as heparin and thrombosis, and the chemistry of urinary antiseptics, make this collection of data and well-digested review material by distinguished investigators outstanding in every respect. The book is recommended enthusiastically not only to those in specialized branches of medicine but also to all who are interested in modern medicine. The synthesis of each subject as it is developed is so well done that the collection merits being termed the best symposium book of the year.

The Doctor and the Difficult Child. By William Moodie, M.D. 8°, cloth, 214 pp. New York: The Commonwealth Fund, 1940. \$1.50.

The author treats this subject in a very simple and wholesome manner. He very wisely avoids attempting to lead the physician into the more recently explored psychologic fields, which offer a rare opportunity for many authors to philosophize and speculate on imaginary situa-

tions. The book sticks to the task of thinking "of the patients just as individuals, differing one from another in themselves, their experiences and their setting, and so varying widely in their methods of thinking and acting." Clearly and concisely, the author presents and evaluates the problems of childhood, and then discusses therapeutic measures as they may be applied directly to the child and indirectly toward the environment. Although the book represents the orthodox approach to behavior problems and personality deviations, as carried on in most of the child-guidance clinics, it will have special value for the physician whose practice brings him in contact with the ordinary problems associated with the process of growing up.

The Era Key to the USP XI and NF VI. Fifth edition. Revised by Lyman D. Fonda, professor of pharmacy, Brooklyn College of Pharmacy, Long Island University. 16°, cloth, 320 pp. Newark, N. J.: Haynes and George Company, Incorporated, 1939. \$1.00.

This is the fifth edition of a popular book that has been in existence for forty-six years. It is small and compact in arrangement, and is designed to give the essential information contained in the *United States Pharmacopoeia* and in the *National Formulary*.

As I Remember Him: The biography of R. S. By Hans Zinsser, M.D., S.D. 8°, cloth, 443 pp. Boston: Little, Brown and Company, 1940. \$2.75.

This biography of a physician is essentially an attempt by a representative of the educated middle class to draw a picture of the period of transition between the nineteenth and twentieth centuries. The story, beginning with childhood, is carried through his career as a medical bacteriologist in Serbia, France, Russia, China and Japan, and ends with thoughts on the fact that he would soon be dead.

The style of writing is vigorous, but frequently unconventional and choppy. One finds interesting anecdotes and incisive phrases, such as, "The whole publicizing of culture is a racket." The author attacks those who want education "in hypodermics or like liver extract." In his discussion of the philosophical aspects of life the author finds no hope in achieving a physicochemical basis for human morality, nor does he seek strength in wishful surrender to a religious faith. Despite these mental confusions he acquires a certain degree of philosophical tranquillity and resignation in the last months of his life. Those interested in the history of medicine, as well as others, will find many good things to reflect on in reading this book.

A Textbook of Physiology. By William H. Howell, Ph.D., Sc.D., LL.D. Fourteenth edition, thoroughly revised. 8°, cloth, 1117 pp., with 330 illustrations. Philadelphia and London: W. B. Saunders Company, 1940. \$7.50.

The first issue of this textbook appeared thirty-five years ago. Since that time, the distinguished author has reflected in subsequent editions the spirit and accomplishments of contemporary physiology. The textual material is incorporated under the influence of two guiding principles: the presentation of facts and theories in simple, lucid style, and the exercise of judicious limitations in the selection of such material as has been justified by experiment and observation. Throughout, the author attempts to show that physiology is a living subject, continually undergoing change and adjustment. The short résumés of the literature and the attention paid to works of historical importance enhance the value of the book.

The New England Journal of Medicine

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VOLUME 224

JUNE 26, 1941

NUMBER 26

EXPERIENCE WITH ELECTRIC-SHOCK THERAPY IN MENTAL DISEASE*

ABRAHAM MYERSON, MD†

WITH THE ASSISTANCE OF LOUIS FELDMAN, MD,‡ AND ISADORE GREEN, MD§

BOSTON

SINCE the introduction of electric shock for the treatment of mental disorders by Bini¹ and Cerletti and Bini,² a considerable literature has accumulated on the subject. It is true that others³⁻⁵ have used electric shock for producing convulsions and unconsciousness, but to the Italian workers should go the credit for introducing the method as a therapeutic measure in mental disease. The practicability and reasonable safety of their work have been confirmed by Kalinowsky,⁶ Shepley and McGregor,⁷ Wyllie,⁸ Muller,⁹ von Braunmühl,¹⁰ Fox,¹¹ Berkwitz,¹² Kalinowsky and Barrera,¹³ and others.¹⁴⁻²⁶ The authoritative American paper is that of Kalinowsky and Barrera. These workers have given over 10,000 shocks and have clearly outlined the method, the advantages and the disadvantages.

The opinions expressed in the literature on the subject may be summarized as follows. The method is less cumbersome than intravenous medication, especially with resistive patients, and is less costly. The loss of consciousness is instantaneous, and the patient does not remember the treatment, so that he does not have the dread of the method that is so conspicuous in Metrazol shock. There seem, on the whole, to be fewer injuries, such as fracture of the dorsal spine. There is not so much general bodily reaction in the sense of increased pulse rate and blood pressure. The results are at least as good as those in Metrazol shock, with which this method is usually contrasted and from which it developed.

The purpose of the study here presented was fourfold: to test the accuracy of the statements made in the literature; more specifically to evaluate electric-shock treatment in the affective psy-

choses or, more accurately, in the affective disturbances, since in many cases the patients in this study had not reached the psychotic stage; to develop a technique for patient-care or even for home-care so as to avoid hospitalization and commitment, and to build up a technique by which fewer shock treatments would be administered to the patient.

MATERIAL AND METHODS

Thirty-six patients were treated: the diagnosis in 24 being depression or depressed obsessive state, in 9, schizophrenia, and in 3, chronic neurosis (Table 1). The average number of shocks was between five and six. In one case (Case 7), however, fifteen shocks were given in two sets of treatments, following which the patient had a complete remission for a month. He then lapsed back into an agitation, which improved greatly after six additional shocks.

An electrical apparatus, made especially for this purpose by Mr. Frederick T. Davis and one of us (L. F.), is constructed essentially as follows. It has a current source of a 60 cycle, alternating, low-frequency type, with a flexibility and range of control from about 50 to 130 volts and from about 50 to 750 milliamperes. This current is further regulated by means of a variac and a special electronic timing device placed in the circuit for accuracy and safety. Special indicators on the panel are connected with pilot lights, which flash off and on when the current enters the machine and when it is flowing through to the patient. From two terminals on the panel there pass two wires, which are attached by means of insulated clips to the patient's contact electrodes. These metal, non-polarizable contact electrodes are circular in shape and about 5 cm. in diameter. A rubber, self-adjustable headband keeps them in contact with the patient's head in the temporal regions. Before application of the moistened electrodes, the resistance of the skin, a very important factor, is reduced by rubbing a paste containing 20 per

*From the Division of Psychiatry, Research, Boston State Hospital. Aided by grants from the Commonwealth of Massachusetts and the Rockefeller Foundation.

†Professor of neurology (emeritus), Tufts College Medical School; clinical professor of psychiatry, Harvard Medical School; and director of research, Boston State Hospital.

‡Formerly assistant in medicine, Tufts College Medical School; and director of hydrotherapy, Boston State Hospital.

§Now visiting neurologist, Beth Israel Hospital.

cent sodium chloride over each temporal region.

Before treatment was undertaken on human beings, this apparatus was used on rabbits and other animals for a sufficient time to ensure its safety.

By experimentation we learned that in the majority of patients, a voltage of 70 with a milliamperage of 350 to 500 delivered for 0.1 second was sufficient to produce convulsive reactions instantaneously or almost instantaneously. In 2 cases

paratus has worked very reliably, and this assurance is made the more definite by the fact that a dose (that is, voltage and time), once it has been established for a patient, gives a constant response.

One other caution should be mentioned: if the dose selected as a trial is insufficient, at least ten to fifteen minutes should elapse before another is given, since the resistance of the tissues diminishes

TABLE 1. *Summary of Results of Electric-Shock Therapy.*

DIAGNOSIS	CASE NO.	AGE	SEX	NO OF TREATMENTS	PERIOD OF TREATMENT	PLACE OF TREATMENT	RESULTS*
		yr					
Depression or depressed obsessive state	1	40	F	3	3 weeks	Outpatient	Remission
	2	21	M	4	4 weeks	Outpatient	Remission
	3	36	F	4	4 weeks	Outpatient	Marked improvement to remission
	4	23	M	6	6 weeks	Outpatient	Great improvement
	5	33	F	4	3 weeks	Outpatient	Improvement
	6†	62	M	7	3 weeks	Hospital	Remission
	7†	64	M	9	4 weeks	Hospital	
				12	4 weeks	Hospital	Marked improvement after relapse
	8	49	F	3	2 weeks	Hospital	Remission
	9	27	F	7	3 weeks	Hospital	Shift to hypomania, remission
	10	60	M	4	2 weeks	Hospital	Remission
	11	60	M	4	10 days	Hospital	Remission
	12	55	F	3	1 week	Hospital	Remission
	13†	47	F	2	1 week	Hospital	No improvement
	14	48	F	3	1 week	Hospital	Remission
	15	48	F	5	1 week	Outpatient	Improvement
	16	42	F	3	3 days	Outpatient	Remission
	17	41	F	5	10 days	Outpatient	Much improvement
	18	29	M	2	2 days	Outpatient	Much improvement
	19	40	F	4	4 days	Outpatient	No improvement, hospitalized
	20	62	M	5	2 weeks	Outpatient	Improvement
	21	22	F	2	3 days	Outpatient	Remission
	22	33	M	3	1 week	Outpatient	Remission
	23	38	F	4	2 weeks	Outpatient	Remission
	24	55	M	4	10 days	Outpatient	Much improvement
Schizophrenia	25†	48	F	18	6 weeks	Hospital	No improvement
	26	23	M	8	3 weeks	Hospital	No improvement
	27†	35	M	1	1 week	Hospital	No improvement
	28	27	M	9	7 weeks	Hospital	Conduct improvement
	29†	22	M	13	4 weeks	Hospital	Temporary, though not substantial improvement
	30	25	M	6	3 weeks	Hospital	No improvement
	31†	21	M	14	4 weeks	Hospital	No improvement
	32	34	F	9	2 weeks	Hospital	Slight improvement
	33	25	F	6	2 weeks	Outpatient	Conduct improvement
Chronic neurosis	34	33	M	2	5 days	Outpatient	No change refused further treatment
	35	40	F	5	1 long interval	Outpatient	No improvement
	36	31	F	5	4 weeks	Outpatient	Improvement

*The term "remission" is used to indicate the recovery from the particular attack, since it is probably certain that future attacks are not averted by this treatment. By marked improvement is meant social recovery with some residual symptoms.

†These patients had previously received a series of Metrazol shock treatments without resulting improvement.

it was necessary to increase the time to 0.2 second to produce a complete convulsion. The convulsion lasts from thirty to forty-five seconds, which would be the equivalent of the phenomenon designated as "absence 4" by Kalinowsky and Barrera.¹³

The timer should be tested each day and, in fact, before each series of treatments. This can be done by setting the timer at one second and noting whether there is any real discrepancy between it and a split second stop watch. The voltage can be tested out by comparing one voltage indicator with the other. It is of special importance that the apparatus be warmed before each treatment, to make certain that it is running at full capacity, since it slows up definitely after a period of disuse. With these precautions this ap-

markedly after a treatment, and comes back to normal only after such an interval.

RESULTS

The convulsions last from thirty to forty-five seconds, which is about the time of a full Metrazol shock. The dosage, however, can be graded to produce, first, unconsciousness without convulsion and, secondly, unconsciousness with a shorter convulsion. This is a real advantage in those cases in which injury has been sustained and in which it is desirable to continue the treatment without the convulsive reaction.

Our experience confirms the fact that there are few injuries if reasonable precautions are taken, and that the general bodily reaction is not so dis-

turbing as in Metrazol shock, since there is less effect on the pulse rate and the blood pressure. In general, the blood pressure drops for a very short period, and after a few seconds the pulse rate comes back to its normal level. It is also true that the period of apnea is not so long as with Metrazol shock.

There was no injury to the spine of any important consequence. We have not made routine X-ray examination. Two patients complained of backache, in these, X-ray films showed no fracture, and the patient recovered from the backache within ten days. No patient was disabled for any length of time by injury to the back.

Elderly patients with moderate degrees of arthritis changes around the shoulders have complained, after treatment, of considerable pain at the site of the disease. We have found no actual change of any disabling type as a result. This pain has usually disappeared within two weeks.

It is not quite true that patients have no dread of the electric shock method. The patient does not remember the shock itself, and there is a retrograde amnesia for events occurring shortly before and after shock treatment, but the fact remains that in some way or other he was rendered unconscious, and because he learns sooner or later that this was done by electric shock, there is some dread, probably due to the general fear that is associated with being knocked unconscious. However, there is very much less dread than in Metrazol shock because, first of all, the actual treatment causes no pain and, secondly, the loss of consciousness ensues so rapidly that there is not the short agonizing hovering between consciousness and unconsciousness that ushers in the Metrazol convulsion and is usually remembered.

In 3 cases in which Metrazol shock had been tried and in which the administration was exceedingly difficult and consequently ineffective, electric shock produced a convulsion, with good results.

In 1 case in which the presence of coronary thrombosis and cardiovascular disease was proved by electrocardiographic examination and a well established clinical history, electric shock was used despite the general risk. The patient was so agitated and so rapidly impairing his nutrition and general resistance that it was the considered opinion of both the consulting internist and the attending psychiatrist that the treatment offered less risk than the disease. This man received seven electric shocks in three weeks, and had a complete remission. He had been followed closely for ten years, and had had a previous attack that lasted three years, there was every indication that this attack was at least as formidable as the previous one. It

can, we think, safely be assumed that the shock method markedly shortened the attack.

In the following 4 cases, few shocks at relatively long intervals were given.

CASE REPORTS

CASE 1 A 40-year-old woman had had three specific attacks under the observation and treatment of one of us (A.M.) each lasting from 6 months to 2 years. They were characterized by anxiety and depression of severe grade. The patient was given three shocks at intervals of 1 week. She improved after the second treatment. The treatment was discontinued at the end of the third, although she was not completely well. Within a week after the discontinuance of treatment, she was entirely well and has remained well since.

CASE 2 A 21-year-old man (brother of the patient in Case 1), for 3 years had suffered from a moderately depressed state with hypochondriasis, which from time to time became definitely delusional. He believed that his eyes, because of a supposed abnormality, rendered other people nervous and caused them considerable agitation and mental distress so that they would have nothing to do with him. This condition did not yield in the least to psychotherapeutic measures or to drugs such as sedatives, amphetamine sulfate, vitamins and hormones. The patient received four treatments spaced 1 week apart. Since he was still attending school they were given on Saturday mornings at a private house and he went home on Saturday afternoon rested until Sunday noon and went back to school on Monday. At the end of the fourth treatment, the patient was feeling very much better, and there seemed to be a steady progress toward recovery. He no longer has any hypochondriasis; the depression is much improved. There is still, however, a latent feeling of inferiority, which does not seem to handicap him.

CASE 3 A 48-year-old woman was seen during her first depressive attack. This had lasted for a year, and she had made no progress toward recovery. In fact, she was probably worse at the period when treatment was initiated than at any previous time. The first two shocks were given within 3 days. By mischance the electric apparatus was not available for a week, when another shock was given. The fourth shock was to be given after 4 days but since she appeared to be entirely well, in fact somewhat hypomanic, — a very common occurrence after shock treatment of any kind — treatment was discontinued. Since that time the patient has had a mild, though not disturbing exhilaration but has been able to go back to her duties and discharge them perfectly well.

CASE 4 A 60-year-old man was first seen by one of us (A.M.) 8 years previously, at which time he had his first attack of depression. This lasted 8 months, and the patient did not completely recover. He went on, however, fairly adequately, with short attacks from time to time, and 1 month prior to admission entered into a major attack in which he reached the stage of delusion formation, as well as marked depression, with failure in sleep, appetite and the visceral urges generally. His delusions were typical — that great harm was to befall him and his family and that there was a constant barrage of persecutions directed against him because of his misdeeds. He was given four shocks in a period of 2 weeks at which time it was felt advisable to see what would happen without

further treatment, although he did not seem particularly improved. Within a week, however, he was very much better. At the present time he is cheerful, the delusions have disappeared, and there is an amnesia for the whole period of treatment as well as for 1 or 2 weeks of the period of his illness prior to treatment. This man had a slight back injury, from which he recovered entirely in 2 weeks.

Because of the experiences outlined above, we have modified our method of treatment as follows: Those patients who are not too actively psychotic are given outpatient treatment, that is, they go to a private house, which has been prepared for this purpose, receive their treatment, are attended by a nurse for a few hours and then go home. Two or three days are allowed to elapse, after which the patients are again seen; treatment is arranged within the next day or two. After the second treatment, a period of four to seven days is allowed to elapse to see whether improvement is commencing. If this improvement is not apparent, treatment is resumed. If at the end of the third or fourth treatment a favorable upward trend seems to be taking place, no further treatments are given, because we have learned that the recovery process, when once initiated, goes on very rapidly. Thus, in a twenty-three-year-old man (Case 4), who had an obsessive depressive state of at least six years' duration, six treatments scattered over a period of six weeks were sufficient to bring him to the state where the obsessiveness entirely disappeared; he is cheerful and active, and although residual symptoms are present, they are fading away, apparently by some natural process of recovery.

We have treated patients in whom the depressive state has been followed by a manic state that, although it was more comfortable for the patient, was not especially easy to handle. Thus, in a twenty-seven-year-old woman (Case 9), who was depressed for nearly a year, two treatments produced a hypomanic state. Continued treatment of the hypomanic state by the electric-shock method did not seem to do any special good, and it was therefore discontinued. The patient is now in the recovery phase of a manic state. The interesting transition from depression to the manic state while under treatment is significant in showing the biologic relation between the two phases. The mechanism of the transition is entirely unknown, and one can only speculate about its genesis.

Of the 24 patients with depressions or depressed obsessive states, all but 3 showed moderate to marked improvement or had remissions following electric-shock therapy.

Of the 9 cases of schizophrenia treated in this series, none were significantly improved so far as

the essentials of the disease process are concerned. Conduct improved in 3. Delusions became less conspicuous. However, the retreat and the incapacity to meet the situations in life were only transitorily changed for the better. There is little evidence that either Metrazol or electric-shock therapy is of fundamental importance in schizophrenia except in relation to some of the catatonic states.

Three cases of neuroses of severe grade were treated. One of these patients was unwilling to continue the treatment after two shocks, because of the unpleasant failure of memory that manifests itself in almost all cases for a short time after shock therapy. The other 2 patients are still under treatment with results that are doubtful. These cases, however, had also resisted other forms of treatment.

SUMMARY AND CONCLUSIONS

Electric-shock therapy seems to be without appreciable danger. It is not recommended in cases of heart disease or hypertension except when there seems, on the whole, to be nothing to lose—that is, when the mental condition is desperate and threatens the life of the patient. In our cases no harm has followed. In one case of definite cardiac disease and in one of distinct hypertension, electric-shock therapy was of great value.

Although no shock therapy can be classed as pleasant, electric-shock therapy is the least disturbing to the patient and creates less fear and resistance to the treatment. It is also more expeditious and can be used in cases in which it is inadvisable to give Metrazol.

It is possible to use this treatment without hospitalization and by what we call the "outpatient method." There is no reason why it should not be used in the patient's own home with sufficient nursing attendance.

The psychoses of choice for treatment are the marked, continuous depressions. The value of the treatment in the hypomanic state is less certain. It has the same general value as Metrazol in the treatment of schizophrenia: a limited but useful value from the standpoint of control of the patient. It is too drastic a method to be used in the neuroses except in the chronic, obsessive and depressive types.

There is a disturbance of memory in many cases for some time after the treatment. This does not seem to be permanent or final. No neurologic sequelae of any kind have been observed in our patients.

It is probably of great advantage to give as few treatments as possible, to wait between treatments to see what progress is being made, and to allow

as much progress as possible to take place without further therapy. In other words, it may be necessary to give only three or four treatments for a complete remission to occur in a depressive state.

It appears that the shock therapy, especially electric-shock therapy, is of unequalled value in the treatment of the depressive mental states.

REFERENCES

- 1 Bini L. Experimental researches on epileptic attacks induced by electric current. *Am J Psychiat* (supp.) 94:172-174, 1938.
- 2 Carleton U., and Bini L. L'electrochoc. *Arch gen de neurol psychiatrie et psychanal* 19:266-278, 1938.
- 3 Clark, G. A. and Wall, T. T. Unconsciousness produced by electric currents. *Quart J Exper Physiol* 24:85-94, 1934.
- 4 Ralimovich L. G. *Sommeil électrique (combinaison des mouvements volontaires et de la sensibilité) par des courants électriques de basse tension et à interruptions modérément fréquentes* 98 pp. Nantes 1936.

- 5 Merritt H. H. and Putnam T. J. A new series of anticonvulsant drugs tested by experiments on animals. *Arch Neurol & Psychiat* 39:1003-1015, 1938.
- 6 Kalinowsky L. Electric convulsion therapy in schizophrenia. *Lancet* 2:1232, 1939.
- 7 Shepley W. H. and McGregor, J. S. Electrically induced convulsions in treatment of mental disorders. *Brit M J* 2:1249-1271, 1939.
- 8 Wyllie A. N. Convulsion therapy of the psychoses. *J Ment Sci* 85:248-259, 1940.
- 9 Mitteilung. *Schweiz med Wchnsch* 70:323-376, 1940.
- 10 von Braunmühl A. Der Elektrokrampt in der Psychiatrie (ein methodischer Hinweis). *München med Wchnsch* 87:511-514, 1940.
- 11 Fox F. F. Clinical experience in electrically induced convulsions. *Brit M J* 1:807, 1940.
- 12 Berkwitz N. J. Faradic shock treatment of functional psychoses: preliminary report. *Journal Lancet* 59:351-355, 1939.
- 13 Kalinowsky L. and Barrers S. E. Electric convulsion therapy in mental disorders. *Psychiatric Quart* 14:719-730, 1940.
- 14 Faust W. Electrical convulsion treatment of mental disorders. *J M A* 115:1821, 1940.
- 15 Spiegel E. A. Quantitative determination of the convulsive reactivity by electric stimulation of the brain with the skull intact. *J Lab & Clin Med* 22:1274-1276, 1937.
- 16 Editorial. Electrical convulsion treatment of mental disorders. *J M A* 115:462, 1940.

TULAREMIA IN IMPORTED RABBITS IN MASSACHUSETTS*

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IN recent years it has been the practice of various Massachusetts game clubs to stock their covers with cottontail rabbits imported from states west of the Mississippi River. On April 25, 1940, we were able to demonstrate the presence of tularemia in a rabbit imported from Missouri. The finding of a second diseased rabbit on November 16, 1940, this time from Arkansas, confirmed the fact that rabbits infected with tularemia are being introduced into Massachusetts. The importance of tularemia, its rapid spread among wild mammals, its ready transmission from animals to man, and the occurrence of three endemic human infections in Falmouth since 1937 warrant bringing these findings to the attention of Massachusetts physicians.

TULAREMIA

Tularemia, a disease of lower animals and man, is caused by a plaguelike bacterium, *Pasteurella tularensis*. The disease in man is characterized by the rapid onset of typhoidal symptoms and the associated development of an ulcerating lesion with local adenitis at the site of infection. The mortality rate is about 5 per cent.

Incidence in man. Since 1919, human infections have been recognized in forty-eight states and the District of Columbia, and since 1925, in ten foreign countries. The number of reported cases and deaths appears to be increasing. Up to

1924, only 15 cases had been reported. From 1924 to 1935, a total of 6206 cases occurred in the United States with 299 deaths, the highest incidence being in Illinois, Ohio and Virginia. In 1938, 2088 cases with 139 deaths were reported, and in 1939, 2200 cases with approximately 150 deaths.¹

New England has been comparatively free from the disease, a total of 8 human cases having been reported: Maine, 1; Vermont, 0; New Hampshire, 1; Connecticut, 1; Rhode Island, 1; and Massachusetts, 4. The 4 Massachusetts cases included a man infected from a refrigerated rabbit shipped from Illinois in 1930 (no epidemiologic significance as an imported market rabbit)²; a ten-year-old girl at Falmouth in 1937 (evidently infected by a dog, which presumably had acquired the infection from rabbits)³; a six-year-old girl at Falmouth, bitten by a tick in 1938⁴; and a woman at Falmouth, bitten by a tick in 1939.⁵

Incidence in animals. The disease has been observed in a variety of animals. Human infection has been traced to twenty-four forms of wild life, though wild rabbits and hares account for over 90 per cent of infections in man. The hosts include wild rodents, other wild mammals, domestic mammals and game birds.

Transmission. Most human infections are acquired in handling diseased animals, chiefly rabbits, the organisms entering the body through wounds, superficial abrasions or the conjunctiva, usually during the skinning, dressing or dissection of the animal. Thus marketmen, hunters and housewives who dress rabbits become in-

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fected. The dissection of infected animals has caused 56 cases of infection in laboratory workers. Miscellaneous infections have been reported from the dressing of or from the bites of other animals. The eating of insufficiently cooked wild-rabbit meat has caused 20 cases, and water-borne epidemics have been reported in man in Russia and in beavers in Montana.¹

The organism may also be transmitted from animals to man by the bites of insects. The Rocky Mountain wood tick (*Dermacentor andersoni*) has caused 53 human cases in Montana and surrounding states; the American dog tick (*D. variabilis*), 73, principally in the southern states; the deer fly (*Chrysops discalis*), 68 in Utah and neighboring states; and undetermined species of insects, 9. The rabbit tick (*Haemaphysalis leporis-palustris*) is the chief factor in the transmission of the disease from rabbit to rabbit.

IMPORTED RABBITS

During the last two years, 219 rabbits imported by Massachusetts game clubs have been examined at our laboratories at the request of the Division of Fisheries and Game of the Massachusetts Department of Conservation. Post-mortem conditions permitted complete examination of only 136. These rabbits either died in transit or shortly after arrival in Massachusetts. In this series, previous to the discovery of the first rabbit with tularemia, 109 rabbits had been examined, with negative results. In the interval between the finding of the first and the second infected rabbit, 24 others showed no signs of tularemia. Also, no evidence of tularemia was found in a previous series of 194 imported rabbits examined in 1937. The presence of tularemia in 2 out of 330 rabbits, or 0.6 per cent, corresponds closely with the usually accepted incidence of 1 per cent infection among wild rabbits.

The existence of tularemia was demonstrated by the detection of lesions in the liver and spleen, by the production of the disease in guinea pigs, and by the isolation of the causative organism, *Pasteurella tularensis*. Our findings were verified from the original material by Dr. Edward Francis, of the National Institute of Health, United States Public Health Service, who obtained further confirmation by agglutinating the organism with known tularemic serum.

From 1937 to 1940, 24,689 imported western rabbits (24,474 cottontails and 215 jacks) were liberated in Massachusetts. Of these 7091, or 28.7 per cent, were released in the tick-infested counties of southeastern Massachusetts (Barnstable 1807, Bristol 3329, Dukes 142, Nantucket 340 and Plymouth 1473). The two tularemic rabbits were

found in the following shipments: 51 rabbits (9 dead) from Rutledge, Knox County, Missouri, received by the Rockdale Rod and Gun Club, of Northbridge, in April, and 84 rabbits (25 dead) from Berryville, Arkansas, received by the Weymouth Sportsmen's Club in November.

DISCUSSION

The imported rabbits are admitted to Massachusetts under certification by the accredited health authorities at the shipping sources. The certificates state that there has been no epidemic of tularemia or rabbit fever in the last two years in the counties in which the rabbits are trapped, and that these counties are free from contagious and infectious rabbit diseases. The presence of tularemia in certified rabbits from two states indicates that such guarantees are inadequate to prevent the inclusion of tularemic rabbits in these shipments. Since tularemia exists in practically all states exporting rabbits, the best safeguard against its introduction into Massachusetts is the enactment of legislation prohibiting the importation of rabbits. Such legislation has been enacted by at least three states—Connecticut, New Hampshire and Ohio.

Not all infected rabbits die during shipment. Those recently infested with diseased rabbit ticks or possibly infected by close contact with diseased rabbits before and during shipment may be liberated. It is fair to assume that tularemia has been present in a fraction of 1 per cent of the 24,689 rabbits so far liberated. Since the disease is transmitted from rabbit to rabbit by the rabbit tick, it is likely to spread among the native rabbits and also among other wild mammals and birds, thus endangering the supply of indigenous rabbits and wild game.

The American dog tick, *D. variabilis*, a known vector, is abundant in southeastern Massachusetts, south of Plymouth and east of Marion. The larvae and nymphs feed on small rodents, particularly field mice, and the adults on larger mammals and man. Thus this tick is capable of transmitting tularemia to both animals and man, since infection acquired by the larva or nymph persists in the adult and may even be transmitted to subsequent generations. A widespread infection among these ticks would result not only in damage to game animals but also in danger to man, since, although tularemia is most frequently acquired through contact with diseased rabbits, it is also transmitted by infected ticks.

The 3 cases of human infection reported from Falmouth since 1937, 2 from bites of ticks, indicate the presence of tularemia in the wild animals and ticks of that region. It is an interesting

coincidence that these endemic human cases developed after imported rabbits were first liberated in 1937. The establishment of other endemic foci in native wild animals from imported rabbits appears inevitable, and additional cases of human infection are to be expected in tick infested areas

SUMMARY AND CONCLUSIONS

The presence of tularemia has been demonstrated for the first time in imported rabbits liberated by Massachusetts game clubs. Infected rabbits have been found in shipments from Missouri and Arkansas.

Certification at the shipping source that these rabbits are from tularemia free districts does not guarantee freedom from this disease.

The importation of tularemic rabbits threatens to establish endemic foci in native rabbits and

other wild game that may ultimately reduce the wild life population.

Since 1937, 24,689 imported rabbits have been liberated in Massachusetts. The first three endemic cases of human tularemia in this state have been reported since 1937.

In the interests of public health the further importation of rabbits should be prohibited by legislation, even though an endemic focus of tularemia appears to have been established.

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REFERENCES

- 1 Tularemia. *Pub Health Rep* 55:667-60 1940
- 2 Watt H F R. A case of tularemia. *New Eng J Med* 202:329 1930
- 3 Badger T L. Tularemia: report of a case of the typhoidal form. *New Eng J Med* 220:187-191 1939
- 4 Francis E. personal communication
- 5 Moss R E and Evans L R. Tularemia: report of a case contracted on Cape Cod. *New Eng J Med* 223:885-887 1939

HEALED STAGE OF PERIARTERITIS NODOSA*

Report of a Case

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PERIARTERITIS nodosa is characterized by a multiplicity of clinical and laboratory features. The symptomatology in any one case depends on the stage of the disease and the organ predominantly involved. In general, however, most cases manifest a strong allergic tendency. This syndrome was first described by Kussmaul and Maier¹ in 1866, and since that time numerous isolated cases have been reported in the literature; the etiology is still obscure, however, and the primary locus of origin of the process in the arteries is not settled. Rackemann² reviewed 245 cases in the literature, and found asthma in less than 10 per cent, and high eosinophilia—over 25 per cent—in about 14 per cent. He stated that there is insufficient evidence at present to say that periarteritis nodosa is an allergic disease. Cohen, Kline and Young,³ Swift, Derick and Hitchcock⁴ and Harvey⁵ favor an allergic or hyperergic basis for the disease. Because the disease is not confined to the adventitia of the vessels, Dickson⁶ has appropriately changed the name to "polyarteritis nodosa."

The classification devised in 1930 by Arkin⁷ is interesting. He divided the disease into four dif-

ferent stages, based on the histologic structure of the transformations in the arteries. He included in his series a "healed granulation tissue stage," with a report of one case. In this case, the histologic changes, which were considered characteristic, were intimal proliferation, with new formation of elastic fibrils, leading to stenosis or even complete occlusion; extensive destruction of the media, including the elastica interna, or of the entire vessel wall, with aneurysm formation and thrombosis—the thrombosis was followed by complete organization, with occasional deposition of hemosiderin; a periarterial healed granulation tissue mantle, consisting of dense fibrous connective tissue containing capillaries and hemosiderin deposits, extensive destruction, with even aneurysm formation, in arteries, as well as high grade intimal proliferation; healed infarct scars in most organs. This case presented the clinical picture of cardiac insufficiency and renal insufficiency.

In 1939 Weir⁸ reported a case of polyarteritis nodosa in which all stages of the disease, from the earliest acute to healed lesions, were present at the time of death.

CASE REPORT

H M, a 49-year-old carpenter, was admitted to the Maine General Hospital on October 28 1937. He stated

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that he had always been well until December, 1936, when he had influenza. He became afebrile within a few days, but developed a wheezy cough, which persisted until the following June. During the summer months he worked at his trade. Four weeks before admission to the hospital the cough reappeared, and he started to lose weight. A physician made a diagnosis of asthma. After failing to respond to treatment at home, he was admitted to the hospital.

On examination, the patient was sitting upright in bed, with slightly labored wheezy respirations. The temperature was normal. The pupils and fundi were normal. There was no nasal obstruction. No skin lesions were seen. The heart rate was 110 and regular. There was no cardiac enlargement, and there were no murmurs. The blood pressure was 140/90. The radial arteries apparently were not sclerosed, and the pulsations in both dorsalis pedis vessels were good. Chest examination showed limited expansion, many musical rales and prolonged expiration. The urine had a specific gravity of 1.018, with 40 mg. of albumin per 100 cc. and no casts. Examination of the blood revealed a red-cell count of 4,400,000 with a hemoglobin of 90 per cent, and a white-cell count of 39,500 with 55 per cent neutrophils, 32 per cent eosinophils and 13 per cent lymphocytes. The blood Kahn and Hinton reactions were negative. Skin tests for foods and pollens were unsatisfactory, since the patient reacted to all. The Bachman skin test for trichinosis was negative.

The symptoms and chest findings remained the same during the next 3 weeks. Partial temporary relief was obtained with adrenalin. A vesicular eruption appeared on the forehead and extremities. This was thought to be due to iodides, which had been given for cough, and gradually disappeared after the iodides were discontinued. A white-cell count on November 4 was 43,600, with 73 per cent eosinophils. On November 25, the patient complained of pain in the left axilla. Two days later, very few signs of asthma could be heard, but there were many moist rales over the left base, with a decrease in the percussion note. The sputum showed no pneumococci. The temperature, which had been normal, rose to 103°F. X-ray examination showed increased density in the left base. The white-cell count was 34,000, with 65 per cent eosinophils. The temperature continued from 99.5 to 102°F. The cough became more productive, and on December 16 x-ray study still showed increased density at the left base. A small lung abscess was considered probable, and postural drainage increased the sputum output. The white-cell count fell to 12,000, with only 3 per cent eosinophils. The productive cough continued, but the patient was able to eat a regular diet, in spite of an afternoon temperature of 100°F, which persisted until 10 days before discharge. On January 21, 1938, the left lower-stem bronchus was injected with lipiodol. There was considerable puddling of the oil in an area just above the left diaphragm and behind the left border of the heart. The bronchi in this area were apparently dilated, leading to the conclusion that this represented a bronchiectasis. The patient, at that time, was comparatively free of asthma, which had been so troublesome during the 1st month of hospitalization. Postural drainage was continued. The amount of sputum, which at one time measured 290 cc. daily, gradually decreased, and at the time of discharge on February 15, it was about 30 cc. daily. There was an apparent increase in weight, although the patient was not weighed. The red-cell count was 4,100,000 with a hemoglobin of 68 per cent, and the white-cell count was 12,400 with 72 per cent neutrophils, 3 per cent eosinophils and 25 per cent

lymphocytes. Examination of the urine showed a specific gravity of 1.012 (before breakfast), 5 mg. of albumin per 100 cc., no sugar, a few hyaline casts and 6 to 8 red cells per high-power field. The patient was discharged with final diagnoses of bronchial asthma, bronchopneumonia, lung abscess and bronchiectasis. However, in reviewing the case at the following monthly medical-staff meeting, periarteritis nodosa was considered to be a strong probability.

The patient was readmitted on November 27, 1938. He stated that he had had a "fairly comfortable" summer, but that for the previous month two or three mild asthmatic attacks had occurred daily. They were easily controlled with inhalations of a 1:100 solution of adrenalin chloride. His acute illness had begun 1 week before admission, during which time frequent hypodermic injections of a 1:1000 solution of adrenalin chloride were necessary to control the asthma.

The appearance of the patient on admission was essentially the same as that on his first admission. The temperature was 103°F. The chest was full of musical rales. There was no dullness on percussion. X-ray examination revealed irregular rectangular masses in the mid-hilus regions, with extension outward toward the periphery on both sides. Opinion was reserved by the roentgenologist. The white-cell count was 31,600, with 31 per cent eosinophils. Urine examination showed 400 mg. of albumin per 100 cc., with many hyaline and granular casts, and 10 to 20 red blood cells per high-power field. The blood pressure was 148/90. The cardiac rhythm was regular, and the rate was 110. A small piece of pectoralis major muscle removed for examination failed to show evidence of vascular disease. A bone-marrow biopsy showed 41 per cent eosinophils, with an otherwise normal smear.

The temperature gradually returned to normal at the end of 3 weeks. The asthmatic attacks decreased in number and in severity, and with the disappearance of the fever, further medication for this condition was not necessary. However, the urine still contained a large amount of albumin, with both hyaline and granular casts and numerous red blood cells. The blood urea nitrogen remained normal. Examination of the blood showed a red-cell count of 3,130,000 with a hemoglobin of 58 per cent, and a white-cell count of 27,400 with 43 per cent neutrophils, 45 per cent eosinophils, and 12 per cent lymphocytes. The chest was clear except for a decrease in breath sounds over a small area in the left base. Following an afebrile period of a week, the patient was extremely desirous of going home, and was discharged on December 24 with a diagnosis of probable periarteritis nodosa.

A third admission occurred on April 10, 1939, when the patient was admitted to the Surgical Service. Following the last period of hospitalization, he had been in comparative good health and had required no medication for asthma. During the previous winter, a small, easily reducible right inguinal hernia had appeared. During the 3 days before entry he had been unable to reduce the hernia, and his bowels had not moved. On the morning of admission, the vomitus was said to have been fecal in character. Operation was performed immediately under spinal anesthesia. The surgical records show that the operation was performed without difficulty, and that the bowel was not gangrenous. Twelve hours later the temperature was 104°F. There was very little cough, and chest examination was essentially negative. From a small amount of sputum, which was all that could be obtained, a Type 2 pneumococcus was cultured. Although x-ray films taken with a portable machine failed to show con-

solidation, sulfapyridine was given, and the temperature returned to normal at the end of 48 hours. Examination of the blood revealed a hemoglobin of 65 per cent, and a white-cell count of 14,800, with only 2 per cent eosinophils. The urine still contained a large amount of albumin, with both hyaline and granular casts and red blood cells. The blood pressure was 120/80. The patient was discharged by the Surgical Service with a diagnosis of strangulated right inguinal hernia.

The patient was admitted for the fourth and last time on May 8, 1940. During the previous summer he had gained 15 pounds in weight, and had been able to work at his trade for 6 weeks. In January, a cold was contracted. This was followed by a 2 months attack of asthma, which was controlled by inhalations of a 1:100 solution of adrenalin chloride. The asthma ceased rather abruptly, but the patient's strength did not return. Instead, there was increasing weakness with dyspnea not accompanied by wheeziness. The family noticed an increasing pallor. The bowels were looser than usual, and there was nocturia, three to five times a night. Nausea had been present most of the time during the previous month.

The clinical picture was that of chronic renal insufficiency with impending uremia. Air hunger was evident. Cyanosis was not present. There was a distinct pallor of the skin and mucous membranes. The face was slightly puffy. There was no other evidence of peripheral edema. Many moist rales were heard over both lung bases. Asthma was not present. The temperature was 99°F. The heart rate was 100 and regular. The blood pressure was 164/88. The liver edge was thought to be three fingerbreadths below the right costal margin. The spleen could not be felt. The urine examination showed a specific gravity of 1.010, with 200 mg of albumin per 100 cc and both hyaline and granular casts and red blood cells in the sediment. The blood urea nitrogen was 115 mg. The red-cell count was 1,900,000 with a hemoglobin of 30 per cent, and the white-cell count 10,800 with 83 per cent neutrophils, 2 per cent eosinophils and 15 per cent lymphocytes. Pulmonary edema gradually increased, in spite of an attempt at parenteral digitalization, and death occurred 6 days after admission.

Autopsy. The heart was slightly hypertrophied, weighing 400 gm. The right lung weighed 725 gm, and the left 525 gm, and there was congestion and atelectasis of the more dependent portions. The spleen weighed 210 gm, the tissue was firm, and there was a distinct subcapsular zone of gray tissue 3 mm thick, the pulp was dark red and contained an occasional gray firm focus up to 8 mm in diameter, resembling a tubercle. The liver weighed 1875 gm and, except for a scarred subcapsular focus 0.5 cm in diameter, was not remarkable. There was congestion of the gastric mucosa. In the first portion of the duodenum an area 1 cm in diameter in the mucosa was granular, and the wall thin. The remainder of the gastrointestinal tract merely showed congestion of the mucosa. The right kidney weighed 75 gm, and the left 90 gm. The capsules stripped with difficulty, to reveal a pale yellow gray, finely granular surface, with occasional elevated coarse granules. The cortex varied from 2 to 4 mm in thickness. The pelves and calyces were not dilated. A few scattered atheromatous deposits were present in the aorta. The brain weighed 1300 gm and was essentially normal.

Microscopic examination reveals lesions in the small

and medium sized arteries of the duodenum, spleen, kidneys, heart and lungs that are characteristic of the healed end stage or scar tissue stage of periarteritis nodosa, as described by Arkin.⁷ The involved vessels are either completely or almost completely replaced by dense scar tissue, with marked narrowing or absence of lumens (Fig 1). As a result of this process in the kidney, practically all the glomeruli are sclerosed. In only one vessel of all the tissues studied is there any evidence of activity. That is in the kidney, where one medium sized artery shows occlusion of the lumen by scar tissue, in which fibrin and leukocytes are scattered through the wall, with a perivascular lymphocytic and polynuclear infiltrate.

This patient died of renal failure and uremia, resulting from a healed arterial and arteriolar process in the kidneys.

In the case described above, the lesions in the vessels of the spleen, kidneys, duodenum, lungs and heart were all healed and were characterized

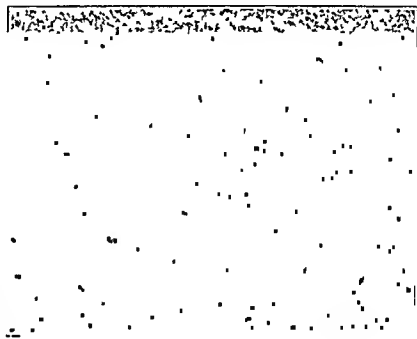


FIGURE 1 Low Power Photograph of One of the Occluded Arteries in the Spleen

by collagenous thickening of the vessel walls to the extent that in the spleen and kidneys many of the lumens were completely occluded, occasionally there were hemosiderin deposits and periarterial lymphocytic infiltrations. In only one vessel in all the sections studied was there any evidence of activity in or about the vessels.

In this single case, we are unable to say in which coat of the vessels the disease began, or what the etiologic factor was, but the presence of fever, leukocytosis, eosinophilia and asthma is in favor of an inflammatory process, possibly on a hyperergic basis. Clinically there were periods when the patient was symptom free, a fact that suggests some resistance to the allergic stimulus. The vascular processes did heal, but by their very nature resulted, especially in the kidney, in an ischemic process that, once initiated, was progressive and not reversible. In such cases, the more

completely healed and fibrotic the vessels become, the more occlusion takes place, with ischemic necrosis occurring in structures dependent on these vessels for blood supply.

SUMMARY

A case of periarteritis nodosa is presented in which the vascular lesions were healed at the time of death.

The cause of death was renal insufficiency.

REFERENCES

1. Kussmaul, A. and Maier, R. Ueber eine bisher nicht beschriebene eigenthümliche Arterienkrankung (Periarteritis nodosa), die mit Morbus Brightii und rapid fortschreitender allgemeiner Muskelatrophie einhergeht. *Deutscher Arch. f. klin. Med.* 1:484-518, 1866.
2. Rackemann, F. M. in discussion of Harkavy.²
3. Cohen, M. B., Kline, B. S. and Young, A. M. The clinical diagnosis of periarteritis nodosa. *J. A. M. A.* 107:1555-1558, 1936.
4. Swift, H. F., Derick, C. L. and Hitchcock, C. H. Bacterial allergy (hyperergy) to nonhemolytic streptococci. *J. A. M. A.* 90:906-908, 1928.
5. Harkavy, J. Vascular allergy in the pathogenesis of bronchial asthma, with recurrent pulmonary infiltrations and eosinophilic polyserositis. *J. Allergy* 11:622-627, 1940.
6. Dickson, W. E. Polyarteritis acuta nodosa and periarteritis nodosa. *J. Path. & Bact.* 12:31-57, 1908.
7. Arkin, A. A clinical and pathological study of periarteritis nodosa. *Am. J. Path.* 6:401-426, 1930.
8. Weir, D. R. Polyarteritis nodosa. *Am. J. Path.* 15:79-88, 1939.

ORTHOPEDICS IN NEW HAMPSHIRE*

EZRA A. JONES, M.D.

MANCHESTER, NEW HAMPSHIRE

THIS meeting is of historic importance to the New Hampshire Medical Society, and because of this, I feel it is of interest at the present time, and probably will be in the future, to record the history of organized orthopedics in New Hampshire during the last quarter century, especially as it relates to crippled children. Moreover, the president of this society is expected to make an annual address, and unfortunately the election to this position does not invest me with oratorical or oracular powers. Therefore, I should like to talk about orthopedics, because that is the only work I have done for the past twenty-five years.

Although something has always been accomplished in this state for the relief of crippled children, orthopedic surgery itself, one of the newer specialties of medicine, did not attract many to it until after World War I. In 1923 in the United States there were 327 surgeons who devoted their time exclusively to orthopedics, in 1940 there were 1077. But even before this country entered World War I, New Hampshire was organizing for orthopedic work.

In 1914 the District Nursing Association of Manchester, an organization supported by private subscriptions, began holding clinics every two weeks in a room on Lake Avenue here in Manchester. In the beginning, the patients were referred to the clinic by local physicians and city nurses, but later, physicians in surrounding communities began sending their patients there. Dr. W. Russell MacAusland, of Boston, came up every fortnight to super-

vised the orthopedic work. Growth of interest was constant.

In 1925 the records show that 1200 patients, representing twenty-six towns in this state, had visited the clinic. At that time there were no funds for hospitalization. But later the State did appropriate \$2500 for braces. Some money also was received from various societies. In this connection I want to emphasize the philanthropy of the service clubs in supplying funds and the generosity of the hospitals in providing free beds. In that period, so meager were our physical resources, it was necessary to do manipulations and plaster work at the district-nursing rooms. We have gone a long way since then, both in financing methods and in clinic facilities.

There also is value in noting the type of cases that came to the clinic in those early years. Most of them were of long standing, with marked contractions and deformities. It will be recalled that infantile paralysis was prevalent at that time, and seemed to be of a type more virulent than at present—that is, more muscle groups were involved than in the cases we are seeing now. As time has gone on, these cases have been recognized earlier, and deformities, because of prompt treatment, are therefore less marked.

Next in number to infantile-paralysis cases, came those of tuberculous bone and joint disease. In the period of which I speak, patients came to the clinic with marked bone destruction, and in the spinal cases, kyphosis was nearly always present. Today, owing to improved hygienic conditions, bone tuberculosis is rather infrequent, and its early recognition

*Presidential address delivered at the annual banquet of the New Hampshire Medical Society, Manchester, May 14, 1941.

makes treatment possible before deformities occur. This also is true of the deformities caused by rickets. In 1920, operations for bowlegs were performed frequently. Today, thanks to our better knowledge of diet, an osteotomy for bowlegs is rarely done.

Another decrease is noted in birth injuries, especially obstetric paralysis of the arm. In the first eight years, we had 24 cases of obstetric paralysis, in the last fifteen years, there have been only 18. This is, of course, due to improved obstetric technique, and shows the effect of medical advance over twenty five years.

Tremendous benefit also has resulted from the interest of laymen. An outstanding instance is the part so willingly played by the Rotary Club of Nashua. In 1921 this club sponsored a weekly crippled children's clinic, which has continued ever since. It has been of immeasurable benefit not only in Nashua, but in the towns of the southern part of the State. Its record of achievement indicates that 1124 patients have been treated at the clinic since 1921; and that twenty-eight towns have taken advantage of the facilities available. Interest in this work grew until in 1939 a building was erected that serves both as rooms for the weekly clinic and as headquarters for the New Hampshire Crippled Children's Society. In addition, the Rotary Club of Keene has practically underwritten the work that is done for crippled children in Cheshire County.

Mention of the New Hampshire Crippled Children's Society prompts me to say that the work in behalf of these youngsters had its greatest impetus in 1936, when this society was formed. This is a branch of the International Crippled Children's Society, and was founded by men and women who had been interested in the work in New Hampshire for many years. Easter Seals, generously purchased by the public, provide a measure of the necessary funds. Other money is received from private contributions. Approximately \$12,000 is available from these two sources. Additional funds became available in 1937 when the society brought to the attention of the legislature the need of more funds for the work among crippled children. The legislature was prompt to appropriate \$11,000 to the State Board of Health, the money to be used among the crippled children of the State. That sum was matched by the federal government, thus bringing the amount available from the State Board of Health to \$22,000. This year Governor Blood has raised the appropriation in his health budget. This will render further help.

I want to speak, too, of the President's Ball Fund for Infantile Paralysis, which has raised about \$6000. This sum is handled by a special

made up in part by members of the New Hampshire Crippled Children's Society and of the State Board of Health.

The arrangements of these three groups—the President's Ball Fund, the New Hampshire Crippled Children's Society and the State Board of Health—are such that there is very little duplication of work. The fund of the State Board of Health is under federal regulation and designates the type of case and the age of the patient to be treated, the age limit being twenty-one. The President's Ball Fund is used for infantile paralysis only, but there is no age limit. Neither of these two organizations can supply transportation either to or from clinics or hospitals. However, the New Hampshire Crippled Children's Society is able to use its funds in any way the board sees fit, and therefore supplies the aid the other two groups cannot. Thus, thanks to the collaboration of the three organizations, coordinated aid to all types and all ages of cripples is made possible.

Since the organization of these three groups, regular clinics have been established, and two state nurses, especially trained in orthopedic work, are available. Clinics are held in Manchester and Nashua every week, in Concord every five weeks, in Laconia every two months and in Littleton every three months. At these clinics, examinations are made, records are kept, and some treatments are given. State nurses attend all clinics, do follow-up work at patients' homes and see that the patients are returned to the clinic nearest their homes for observation at the proper time, or to hospitals for operation.

The average attendance at these clinics is about 30, but the high number at any one has been 57 patients. Since the start of the state work and up to May 1 of this year, 1878 patients under twenty-one have been treated or are under treatment. This number, together with the approximately 600 patients who are not on the state-board records, show, I believe, that New Hampshire, taking into consideration the comparatively small amount of funds available, is doing a class of work among crippled children that is not exceeded by any other state.

These results have only been made possible by the many doctors, nurses and laymen who have been interested in the work. I wish it were possible for me to be specific and name all those who have contributed their support to this program. This cannot be done, however, but they all have the satisfaction of knowing that efficient work has been effected and that machinery has been organized which will carry on this work for long years to come.

Elm Street

MASSACHUSETTS MEDICAL SOCIETY

PROCEEDINGS OF THE COUNCIL

Annual Meeting, May 21 and 22, 1941

THE annual meeting of the Council of the Massachusetts Medical Society was called to order at 10:30 a.m. in the Swiss Room of The Copley-Plaza, Boston, on Wednesday, May 21, by the president, Dr. Walter G. Phippen, Essex South; 263 councilors were present (Appendix No. 1).

The records of the special meeting of April 9, 1941, as published in the May 8, 1941, issue of the *New England Journal of Medicine* were presented by the Secretary *pro tempore* and approved by the Council.

The following nominating councilors answered to the roll call by the Secretary *pro tempore*: W. D. Kinney, Barnstable; P. J. Sullivan, Berkshire; W. H. Allen, Bristol North; E. F. Cody, Bristol South; F. W. Snow, Essex North; F. J. Barnard, Franklin; A. G. Rice, Hampden; W. J. Collins, Hampshire; R. R. Stratton, Middlesex East; Dwight O'Hara, Middlesex South; D. D. Scannell, Norfolk; W. G. Curtis, Norfolk South; W. H. Pulsifer, Plymouth; W. B. Breed, Suffolk; R. P. Watkins, Worcester; and B. P. Sweeney, Worcester North. No nominating councilors or alternates from the Essex South and Middlesex North districts responded.

Dr. J. Harper Blaisdell, Middlesex East, made the following motion:

That if and when we adjourn it be until Thursday, May 22, at the end of the Annual Discourse, which follows the annual meeting of the Society.

Dr. Phippen explained that the motion was necessitated because of the proposed changes in the by-laws creating the position of president-elect, since this officer could not be elected until after the changes had been adopted at the annual meeting of the Society. The motion was seconded by Dr. Charles E. Mongan, Middlesex South, and was passed by unanimous vote.

The nominating councilors then retired.

REPORTS OF STANDING COMMITTEES

State and National Legislation

The chairman, Dr. Henry C. Marble, Suffolk, presented an informal report.

Dr. Marble spoke of the bill specifying that the requirements for admission to the practice of medicine in Massachusetts be the same as those of the National Board of Medical Examiners. This bill was approved by the Society and opposed by the

secretary of the Board of Registration in Medicine; it was given "leave to withdraw."

He then said that the bill requiring that barbiturates be only sold on prescription, which was approved by the Society but opposed by the druggists' lobby, was defeated; and added that the bills concerning premarital examination, which were, in general, approved by the Society, were still in committee.

He added that the bill to place a medical officer in the Department of Industrial Accidents, which was approved by the Society and opposed by the American Legion and the American Federation of Labor, was dropped.

The bill permitting the creation of a medical-service corporation, sponsored by the Society, was reported by Dr. Marble to have been approved by the lower body of the Legislature and awaited approval by the Senate.

He stated that the bill petitioning a separate board of registration for the osteopaths had been withdrawn, and that those asking for a postponement of the effective date of the Approving Authority had also been withdrawn.

In regard to the bill sponsored by the Nurses' Association to create a separate board to control various nursing activities, Dr. Marble said that the committee had agreed with certain hospital authorities that such a board should be under the advisory control of a supervisory board, composed chiefly of physicians. This suggestion, however, was not incorporated in the bill as presented. He stated that the committee had been told that the bill had been entirely rewritten in the legislative committee.

Dr. Marble said that the perennial antivaccination bill had been given "leave to withdraw."

The bill to prohibit the sale of ethyl alcohol except on prescription was favored, but strongly opposed by the druggists' lobby, and defeated 110 to 87. Likewise, the committee's efforts to support the antifireworks' bill were of no avail.

Dr. Marble concluded by stating that all efforts of the committee had been of the nature of "sniping" and that it seemed to him that, in the future, the Society should take the initiative on legislative matters pertaining to medical care.

It was moved that the report be accepted, but Dr. Mongan brought out the point that, according to the by-laws, the report of a standing com-

mittee should be an official report by the committee rather than an informal report by the chairman. During the discussion that followed Dr Marble acknowledged that the report as given had not been signed by the members of his committee. Dr Mongan moved that the report be tabled until such a time as the committee made a written report. The motion was seconded, and eventually carried, 96 to 90.

Dr. Charles C Lund, Suffolk, moved that Dr Marble and his committee be thanked for their efforts and for their informational report of progress. This was seconded. After some discussion, the motion was passed.

Membership

The report (Appendix No 2) was presented by the chairman, Dr. G Colket Caner, Suffolk. It was approved by the Council.

Ethics and Discipline

The chairman, Dr Robert L DeNormandie, Suffolk, presented the report (Appendix No 3), which was accepted by the Council.

Medical Education and Medical Diplomas

The report (Appendix No. 4), presented by the chairman, Dr John P. Monks, Suffolk, was accepted by the Council.

Public Health

The chairman, Dr Francis P. Denny, Norfolk, presented the report (Appendix No 5), which was approved by the Council. He then moved that the Society adopt the resolution contained in the report of the committee; this was seconded and so voted.

Medical Defense

The report (Appendix No 6), presented by the chairman, Dr Arthur W. Allen, Suffolk, was accepted.

Arrangements

The report (Appendix No 7) was read by the Secretary *pro tempore* and was accepted.

Others

There were no reports from the Committee on Financial Planning and Budget, Committee on Permanent Home and Committee on Publications.

REPORTS OF SPECIAL COMMITTEES

Public Relations

The secretary, Dr Elmer S Bagnall, Essex North, presented the report (Appendix No 8), which was accepted, together with the recommendations.

Postgraduate Instruction

The report (Appendix No 9), copies of which had been distributed to all members of the Council, was referred to by the chairman, Dr. Frank R Ober, Suffolk. He called attention to the need for all members of the Society to co-operate to guarantee the success of the New England Postgraduate Assembly. The report was accepted.

Physical Therapy

The chairman, Dr Franklin P Lowry, Middlesex South, stated that there was no formal report but that the committee desired to call attention to the fact that a clinic of physical therapy had been established at the Massachusetts General Hospital and that the director, Dr. Watkins, had been made an assistant professor of medicine at the Harvard Medical School. The committee hopes, he added, that this will serve to lay a broad foundation for the future of physical therapy. The informal report was accepted.

Expert Testimony

The chairman, Dr George L Schadt, Hampden, reported that some progress had been made but that no formal report was warranted. The President declared that the report would be considered as accepted.

Industrial Health

The report (Appendix No 10) was presented by the chairman, Dr W Irving Clark, Worcester, and was accepted.

Army Medical Library and Museum

The report (Appendix No 11) was read by the Secretary *pro tempore* and was accepted.

WPA Records

The chairman, Dr. Guy L Richardson, Essex North, presented the report (Appendix No 12), which was accepted. Dr Lund moved that the physician referred to in the report be brought up before the Committee on Ethics and Discipline; this was seconded. After some discussion, chiefly concerned with the fact that the physician was only one of many, the motion was defeated. Dr. Conley brought up the question whether the WPA was supposed to maintain a list of physicians recommended by the local medical society. Dr. Richardson replied that Mr Burns, the State Compensation Officer, had asked for a list of physicians qualified to render service in severe accident cases but that the committee did not consider itself qualified to issue such a list and suggested that every physician licensed to practice in Massachusetts was so qualified.

Restoration to Fellowship

The Council voted to approve the reports of the committees recommending restoration of fellowship, with the usual provision regarding payment of dues, to twelve former members of the Society (Appendix No. 13); no action was recommended by the committee appointed to consider the application of one former member.

Nominating Committee

Dr. Allen G. Rice, Hampden, temporary secretary of the committee, presented the following list of nominations, which was read by the Secretary *pro tempore*:

- For president: Frank R. Ober, Suffolk.
- For vice-president: Edward P. Bagg, Hampden.
- For secretary: Michael A. Tighe, Middlesex North.
- For treasurer: Charles S. Butler, Suffolk.
- For orator: William B. Castle, Suffolk.

There being no further nominations, it was voted that the nominations be closed and that the Secretary *pro tempore* cast one ballot for the nominated officers. The Secretary *pro tempore* announced that he had cast the ballot, and the officers were declared to be duly elected.

APPOINTMENT OF COMMITTEES

The President then announced his nominations for appointment to the various standing committees for 1941-1942. These nominations, with the exception of those for the Committee on State and National Legislation, were duly approved by the Council (the list will be published with the proceedings of the Society in the July 3, 1941, issue of the *Journal*).

As members of the Committee on State and National Legislation, the President nominated the following: H. C. Marble, Suffolk, chairman; B. F. Conley, Middlesex South; C. A. Robinson, Suffolk; E. M. Chapman, Suffolk; L. M. Felton, Worcester. Dr. Norman A. Welch, Norfolk, nominated D. L. Lionberger, Norfolk. Drs. David L. Halbersleben, Charles J. Kickham and Francis P. McCarthy, Norfolk, and Dr. Conley spoke in favor of the retention of Dr. Lionberger on the committee. Tellers were appointed, and the ballots distributed. In reply to a question whether a ballot would be thrown out if less than five names were included, the President replied that it could not, but that he assumed that each councilor would vote for five members. The tellers retired to count the vote.

The Council approved the appointment of committees to consider petitions for restoration to fellowship of two former members of the Society (Appendix No. 14), it being understood that these

committees would not function if the proposed changes in the by-laws were accepted at the annual meeting of the Society.

The appointment of Dr. Fletcher H. Colby as representative from the Society to the Hospital Council of Boston and that of Dr. A. Warren Stearns to confer with the Committee on Medical Health for Defense were confirmed.

INCIDENTAL BUSINESS

It was voted that the Secretary be authorized to issue a new copy of the by-laws, provided the proposed changes were accepted at the annual meeting of the Society.

The action of the censors of the Plymouth District Medical Society in acting favorably on the applications of Dr. Bernard H. Beuthner, of Middleboro, and Drs. Walter Goldstein and Molyneux P. Mathews, of Brockton, was approved, these names having been received by the Secretary *pro tempore* too late to be included in the official list of applicants that was published in the *Journal*.

Dr. Monks moved that the thanks of the Council be extended to Dr. DeNormandie for his work as chairman of the Committee on Ethics and Discipline; this was seconded and unanimously voted.

The meeting adjourned at 12:45 p.m., to reconvene at the close of the annual meeting of the Society on May 22.

* * *

The reconvened meeting of the Council was called to order in the Sheraton Room of The Copley-Plaza at 12:35 p.m. on Thursday, May 22, by the President, following the annual meeting of the Society. No attendance was taken, but approximately 150 councilors were present.

Dr. Ralph R. Stratton, Middlesex East, a member of the Nominating Committee, presented the name of Dr. George L. Schadt, Hampden, as president-elect. It was voted that the nominations be closed and that the Secretary *pro tempore* cast one ballot for the nominated officer. This was done, and Dr. Schadt was declared to be duly elected.

Dr. Leroy E. Parkins, Suffolk, then reported the vote for the Committee on State and National Legislation as follows: Dr. Marble, 148; Dr. Conley, 173; Dr. Robinson, 149; Dr. Chapman, 140; Dr. Felton, 121; Dr. Lionberger, 159. The President declared Drs. Marble, Conley, Robinson, Chapman and Lionberger elected. As his parting words, he urged that the right and privilege of the Council to make nominations from the floor for positions on standing committees be exercised with great caution and discrimination, since

the nominations made by the president of the Society, whom the Council elects and in whom it is supposed to place its trust, carry with them an intimate knowledge of the work of the committees and of the welfare of the Society.

Dr. Tighe then presented a resolution (Appendix No. 15) requesting the appointment of a committee by the American Medical Association, to be known as the Committee on Legal Medicine; he moved its adoption, and it was so voted.

The matter of the tabled report of the Committee on State and National Legislation was brought up. The Secretary *pro tempore* said that he had not received a report from the committee; Dr. Marble was not present. Dr. Lund, former chairman of this standing committee, stated that since he had frequently made informal reports of the type presented by Dr. Marble and since these had always been accepted without question, he believed the report should be accepted. Dr. Morgan called attention to the fact that, if the constitution and by-laws of a chartered organization are not properly followed, its actions may be challenged in a court of law and warned that, if by-laws do not please and satisfy, they should be changed—never broken.

The meeting adjourned at 1:03 p.m.

ROBERT N. NYE, *Secretary pro tempore*

APPENDIX NO. 1

ATTENDANCE

BARNSTABLE

M. E. Champion
D. E. Higgins
C. H. Keene
W. D. Kinney
O. S. Simpson

BERKSHIRE

J. J. Boland
I. S. F. Dodd
H. J. Downey
C. F. Fiske
P. J. Sullivan

BRISTOL NORTH

W. H. Allen
J. H. Brewster
J. L. Murphy
J. A. Reese
W. H. Swift

BRISTOL SOUTH

G. W. Blood
R. B. Butler
E. F. Cody
J. A. Fournier
H. E. Perry

H. P. Sawyer

I. N. Tilden

C. C. Tripp

ESSEX NORTH

E. S. Bagnall
R. V. Baketel
C. W. Bullard
L. R. Chaput
E. H. Ganley
H. R. Kurth
P. J. Look
R. C. Norris
G. L. Richardson
A. F. Shea
F. W. Snow
T. N. Stone
C. F. Warren

ESSEX SOUTH

Bernard Appel
H. A. Boyle
C. P. Brown
C. L. Curtis
R. E. Foss
S. E. Golden
Loring Grimes

P. P. Johnson

J. F. Jordan

B. B. Mansfield

A. E. Parkhurst

O. S. Pettingill

W. G. Plüppen

E. D. Reynolds

J. R. Shaughnessy

J. W. Trask

C. F. Twomey

C. A. Worthen

FRANKLIN

F. J. Barnard

H. L. Craft

A. H. Ellis

W. J. Pelletier

H. G. Stetson

A. H. Wright

HAMPDEN

E. P. Bagg

W. C. Barnes

J. M. Birnie

W. A. R. Chapin

J. L. Chereskin

G. B. Corcoran

E. C. Dubois

P. E. Gear

Frederic Hagler

E. A. Knowlton

M. W. Pearson

A. G. Rice

G. L. Schadt

G. L. Steele

HAMPSHIRE

A. J. Bonneville

W. J. Collins

MIDDLESEX EAST

J. H. Blaisdell

Richard Dutton

E. M. Halligan

J. H. Kerrigan

K. L. MacLachlan

G. R. Murphy

R. W. Sheehy

R. R. Stratton

J. M. Wilcox

MIDDLESEX NORTH

M. L. Alling

H. R. Cohurn

W. M. Collins

R. L. Drapeau

A. R. Gardner

W. F. Ryan

W. H. Sherman

M. A. Tighe

MIDDLESEX SOUTH

E. W. Barron

W. B. Bartlett

Harris Bass

S. M. Biddle

E. H. Bigelow

G. F. H. Bowers

R. N. Brown

R. W. Buck

E. J. Butler

B. F. Conley

D. F. Cummings

C. H. Dalton

H. F. Day

C. L. Derick

J. E. Dodd

J. G. Downing

A. W. Dudley

C. W. Finnerty

F. W. Gay

H. G. Giddings

H. W. Godfrey

B. I. Goldberg

A. D. Guthrie

A. M. Jackson

E. L. Kattwinkel

A. A. Levi

F. P. Lowry

A. N. Makechnie

J. C. Merriam

Dudley Merrill

C. E. Mongan

J. P. Nelligan

E. J. O'Brien, Jr.

Dwight O'Hara

Max Ritvo

E. H. Robbins

E. S. A. Robinson

W. D. Roche

E. F. Ryan

M. J. Schlesinger

W. N. Secord

J. W. Sever

E. F. Sewall

E. W. Small

H. P. Stevens

H. W. Thayer

J. H. Townsend

J. E. Vance

R. H. Wells

Hovhannes Zovickian

NORFOLK

J. R. Barry

Carl Bearse

M. I. Berman

William Dameshek

F. P. Denny

H. M. Emmons

J. C. V. Fisher

Susannah Friedman

David Glunts

B. T. Guild

D. L. Hallersleben

J. B. Hall

R. J. Heffernan

Morris Ingall

H. J. Inglis

I. R. Jankelson

C. J. Kickham

C. J. E. Kickham

E. L. Kickham

D. L. Lionberger

D. S. Luce

C. M. Lydon
T. F. P. Lyons
F. P. McCarthy
F. J. Moran
M. W. O'Connell
H. C. Petterson
Frederick Reis
S. A. Robins
S. M. Saltz
D. D. Scannell
J. A. Seth
J. W. Spellman
J. P. Treanor, Jr.
W. J. Walton
N. A. Welch

NORFOLK SOUTH

C. S. Adams
H. H. A. Blyth
R. L. Cook
F. W. Crawford
W. G. Curtis
D. B. Reardon
H. A. Robinson
W. L. Sargent

PLYMOUTH

J. E. Brady
Charles Hammond
W. T. Hanson
P. B. Kelly
P. H. Leavitt
C. D. McCann
G. A. Moore
D. W. Pope
W. H. Pulsifer

SUFFOLK

H. L. Albright
A. W. Allen
W. B. Breed
W. E. Browne
C. S. Butler
G. C. Caner
E. M. Chapman
David Cheever
M. H. Clifford
Pasquale Costanza
R. L. DeNormandie
G. B. Fenwick
Reginald Fitz
Channing Frothingham
M. N. Fulton
Joseph Garland
A. A. Hornor

Rudolph Jacoby
H. A. Kelly
T. H. Lanman
R. I. Lee
C. C. Lund
H. C. Marble
G. R. Minot
W. J. Mixter
J. P. Monks
Donald Munro
H. L. Musgrave
R. N. Nye
F. R. Ober
J. P. O'Hare
L. E. Parkins
L. E. Phaneuf
Helen S. Pittman
R. M. Smith
Augustus Thorndike, Jr.
E. F. Timmins
Conrad Wesselhoeft
C. F. Wilinsky

WORCESTER

J. C. Austin
W. P. Bowers
L. R. Bragg
P. H. Cook
G. A. Dix
E. B. Emerson
J. M. Fallon
L. M. Felton
E. L. Hunt
E. R. Leib
W. F. Lynch
A. W. Marsh
J. C. McCann
J. W. O'Connor
R. S. Perkins
W. C. Seelye
C. A. Sparrow
G. C. Tully
R. J. Ward
F. H. Washburn
R. P. Watkins

WORCESTER NORTH

E. A. Adams
H. C. Arey
H. D. Bone
J. J. Curley
C. B. Gay
J. C. Hales
B. P. Sweeney

2. That the following named two fellows be recommended for affiliate fellowship in the American Medical Association:

Gray, Hugh B., Potter Place, New Hampshire
Knowlton, Charles D., Rockport

3. That the following named two fellows be allowed to resign under the provisions of Chapter I, Section 7, of the by-laws:

Brown, Henry S., Takoma Park, Maryland
Bryan, William A., Norwich, Connecticut

4. That the following named two fellows be allowed to resign under the provisions of Chapter VII, Section 4, of the by-laws:

Goldberg, Maurice, Amesbury
Litvich, Michael, Revere

5. That the following named fellow be allowed to change his membership from one district society to another without change of legal residence, under the provisions of Chapter III, Section 3, of the by-laws:

From Norfolk to Suffolk
Stevens, William B., Brookline

G. COLKET CANER, *Chairman*

APPENDIX NO. 3

REPORT OF THE COMMITTEE ON ETHICS AND DISCIPLINE

During the year the Committee on Ethics and Discipline has held five regular meetings and one special meeting, over which the president of the Society presided. Reports have been made to the Council of all but the last regular meeting.

Since the last meeting of the Council, the committee has answered many requests for information and advice and has called the attention of several fellows to unethical publicity on their part.

One fellow made rather extravagant statements regarding his hospital in a radio broadcast during a health week sponsored by a local organization. The fellow's attention was called to the fact that his address did not conform to the general principles governing publicity as proposed by the Committee on Ethics and Discipline and accepted by the Council on February 2, 1938.

The committee appreciates the fact that there may be many radio talks by fellows of which it hears nothing. When criticism of a radio address is made, the committee is often asked why it does not criticize all fellows who speak on the radio. The answer, of course, is clear. The committee cannot sit by the radio day by day. Only when such addresses are called to its attention can it take up the matter with individual fellows. The committee does, however, urge all fellows to become familiar with the general principles governing publicity that the Council accepted three years ago. If these suggestions were conscientiously followed, the Committee on Ethics and Discipline would have little or no criticism to make regarding publicity.

During the year the committee has asked for the resignation of three fellows. One has already been acted on. Two resignations have been received since the last meeting of the Council, one because of participation in the procuring of an abortion and the second because of deceit in the case of an automobile accident. In the latter case the fellow asked for a hearing before the Committee on Membership and the Committee on Ethics and

APPENDIX NO. 2

REPORT OF THE COMMITTEE ON MEMBERSHIP

The committee recommends:

1. That the following named four fellows be allowed to retire under the provisions of Chapter I, Section 5, of the by-laws:

Bright, James C., Fall River
Knowlton, Charles D., Rockport
Libby, Mildred A., Worcester
Vickery, Lucia F., Jamaica Plain

Discipline. This hearing was given, following which it was the unanimous opinion of the combined committee that the fellow be asked to resign. The report on these two fellows has already been presented to you by the Committee on Membership.

ROBERT L. DeNORMANNE *Chairman*

APPENDIX NO 4

REPORT OF THE COMMITTEE ON MEDICAL EDUCATION AND MEDICAL DIPLOMAS

The Committee on Medical Education and Medical Diplomas during the past year has devoted its efforts chiefly to drawing up changes in the bylaws relative to the admission to the Society of the graduates of foreign medical schools and unrecognized domestic medical schools. The number of foreign graduates applying for admission to the Society during the last twelve months has been 92. Of these 64, or 69 per cent have been approved by this committee for examination by the censors and 59 have been admitted as fellows of the Society. During this same time the number of graduates of unrecognized domestic medical schools applying has been 80. Of these 27, or 33 per cent, have been approved by this committee for examination by the censors, and 23 have been admitted as fellows of the Society. Therefore, 21 per cent of all admissions to the Society were graduates of foreign schools, 8 per cent were graduates of unrecognized domestic schools while 71 per cent were graduates of approved schools.

There is every indication that soon the number of applicants from foreign schools will decrease while the number of applicants from unapproved domestic schools will show no such decrease. This committee in approving applicants intends to continue to follow the policy enunciated in its last report which was approved by the Council at its recent special meeting.

Two regular meetings were held before the November and the May examinations and one special meeting to consider the case of an applicant about whom the committee had received widely divergent reports.

JOHN P. MONKS *Chairman*

APPENDIX NO 5

REPORT OF THE COMMITTEE ON PUBLIC HEALTH AND THE SUBCOMMITTEE ON PUBLIC EDUCATION

The weekly broadcasts over WAAB the Green Lights to Health, were carried on from November to April a somewhat shorter period than in recent years. The committee has no means of knowing how large an audience it had or how much it accomplished in the matter of health education.

The president of the Society referred to the committee a letter he received from Dr. Edgar C. Yerbury, secretary of the Committee on Mental Health for Defense, a joint undertaking of the Massachusetts Department of Mental Health and the Massachusetts Society for Mental Hygiene. They requested that the Massachusetts Medical Society join with other organizations in sponsoring this movement and appoint a representative to work with them. The committee voted approval of this plan and requested the President to nominate a representative from the Society.

A letter from Dr. Donald B. Armstrong, third vice-president of the Metropolitan Life Insurance Company, was referred to the committee. The company is launching this month a nationwide educational campaign on diabetes and wants the members of this society to be informed of their plans. The field agents of the company will contact individual physicians and supply them with diet and identification cards and other printed matter. Suitable leaflets will also be distributed to the public. It is believed that this material will help both physicians and patients.

At the meeting of the Council on February 5, 1941, a letter from Dr. Herbert Margolis, of the Oral Hygiene Council of Massachusetts, was read and referred to the Committee on Public Health. In brief, this letter, which was printed in the proceedings of the Council (*New Eng J Med* 224 380, 1941) stated that whereas children are not marked absent, "tardy" or "excused" when they attend dental or hospital clinics during school hours, they are so marked when they have an appointment at a dentist's or physician's office. This would seem to penalize children whose parents finance such work.

The Oral Hygiene Council was planning to urge the Boston School Committee to amend its regulations "so that it would excuse a child for medical and dental service which of course covers private medical and dental service as well as clinic and hospital service." If this change were adopted by the Boston School Committee, it was hoped that other communities could be induced to follow its example. The support of the Massachusetts Medical Society in bringing this about was asked for.

Dr. Patrick J. Foley, of the Oral Hygiene Council, met with the Committee on Public Health. In the discussion it was apparent that some members of the committee felt very strongly that the schools were over-emphasizing the importance of a perfect school attendance, with the result that children were attending school when really ill, to the detriment of their own health as well as to others through the spread of communicable disease. The committee voted to recommend to the Council that the Massachusetts Medical Society join with the Oral Hygiene Council in requesting the Boston School Committee to make this change in its regulations, hence the following motion is recommended.

That the Massachusetts Medical Society join with the Oral Hygiene Council of Massachusetts in requesting the Boston School Committee to amend its rules and regulations so that a child may be excused for medical and dental service without being considered an absentee.

FRAZIS P. DE WY, *Chairman*

APPENDIX NO 6

REPORT OF COMMITTEE ON MEDICAL DEFENSE

It is with regret that we report the recent death of our committee member Dr. F. P. Sweet, of Springfield. He was one of the members of the original Committee on Medical Defense and faithfully served continuously until his death.

During the past year only one additional member of the Massachusetts Medical Society has required legal aid in a malpractice suit. In this case, the defendant is insured and is seeking the added support of our attorneys.

One case was satisfactorily disposed of during the year. Another case was tried before a jury in December, 1940, and a verdict was rendered in favor of the defendant. The plaintiff, however, taking the case to the Supreme Court.

Court, so that it cannot, as yet, be considered closed. An additional case appears to be inactive and will probably not be pursued farther. A total of eight cases are pending at this time.

During the year, an attempt was made to circumvent the two-year statute of limitations, which is based on the date of the alleged malpractice. In this case, the suit was brought by the executor of an estate within two years of his appointment but after the time limit of the alleged malpractice. It is of some importance that this exception was not allowed by the courts.

The committee is well pleased with the management of malpractice suits by our legal advisers.

A. W. ALLEN, *Chairman*
E. D. GARDNER
W. R. MORRISON
HORATIO ROGERS, *Secretary*

APPENDIX NO. 7

REPORT OF THE COMMITTEE OF ARRANGEMENTS

We offer the program of this meeting as our report to date. The work of the committee is still unfinished, and we shall render a final report after the annual meeting is over.

EDWARD J. O'BRIEN, JR., *Chairman*

APPENDIX NO. 8

REPORT OF THE COMMITTEE ON PUBLIC RELATIONS

The Council has already endorsed the proposal of the Blue Cross to extend its privileges to physically qualified individuals who have no opportunity to associate themselves with groups. The Committee on Public Relations has considered the form and fee for physical examination of these candidates and recommends your approval of a \$3 base fee, supplemented by extra charges if special examinations are required.

The committee met with Dr. B. W. Mandelstam, medical adviser to the Department of Public Welfare of the Commonwealth of Massachusetts, and considered certain mutual problems.

In a very few communities in this state the hospitalized welfare recipient is charged a fee for physicians' services (for example \$50 for a major operation and \$15 for the assistant). The State cannot allow reimbursement to the town if the town pays these fees, so some cities or towns are sending these cases to hospitals in other communities where no charges for welfare care are permitted by the hospital. The Committee on Public Relations voted not to interfere now with this situation but instead asked the Special Committee for the Study of Welfare Medical Care—Drs. Bagnall, Hunt, Hornor, Duncombe and Pelletier—to endeavor to arrange a fee table for professional service to hospitalized welfare cases throughout the State and to consider the advisability of having the local committees on public relations referee all bills for medical care.

The special committee believes that the profession must come to the position of assuming a degree of responsible censorship wherever there exists an unenlightened tendency to violate principles of fair practice. Some state welfare administrators have regulated these things without first giving the local professional organization an op-

portunity. In this state, the Franklin District Medical Society now supervises all bills for welfare medical care. We recommend that this practice be extended to all district committees on public relations or to special committees, and that these committees be authorized by their district societies to review bills for welfare medical services and to recommend adjustments wherever indicated.

The special committee believes that this is not a strategic time to make endeavors toward procurement of a fee schedule of payments by the State to physicians on welfare cases in hospitals. The whole philosophy of charitable medical service in hospitals by staff physicians is involved. We agree that it may fairly be contended that staff physicians should be compensated for both inpatient and outpatient service, but unless the practice of over a century is to be changed, with all that it involves, evolution rather than revolution is the method of choice.

The Committee on Public Relations recommends that the Council approve the requirement that the delegate to the Committee on Public Relations of the Massachusetts Medical Society be chairman of his district committee and that he be a member of the Council.

E. S. BAGNALL, *Secretary*

APPENDIX NO. 9

REPORT OF THE COMMITTEE ON POSTGRADUATE INSTRUCTION

The postgraduate extension courses for the academic year 1940-1941 ended on April 30. In the past few years, the Society has co-operated with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau in providing this type of postgraduate teaching for all the physicians of the Commonwealth. The Society has appropriated \$1000 to aid in organizing the work; the government agencies have paid all other expenses.

Courses were given in twenty places with enrollment as follows:

DISTRICT	PLACE	1939	1940	1941
Barnstable	Hyannis	33	23	22
Berkshire	Pittsfield	45	50	50
Bristol North	Taunton	31	20	18
Bristol South	{ Fall River	36	22	42
	{ New Bedford	34	54	42
Essex North	Lawrence	48	52	40
Essex South	Salem	54	59	54
Franklin	Greenfield	27	47	34
Hampden	{ Holyoke	30	40	16
	{ Springfield	40	100	36
Hampshire	Northampton	30	32	33
Middlesex East	Melrose	21	54	40
Middlesex North	Lowell	21	25	32
Middlesex South	Cambridge	50	60	25
Norfolk	Norwood	(no course)	26	32
Norfolk South	Quincy	25	20	25
Plymouth	Brockton	35	27	23
Suffolk	Boston	180	172	95
	{ Milford	20	30	30
Worcester	{ Worcester	(no course)	45	(no course)
Worcester North	Fitchburg	35	26	25
Totals		795	964	718

As a part of the national antivenereal disease campaign, the committee has co-operated with the government agencies in providing clinical teaching in gonorrhea and syphilis in the outpatient departments of the Boston Dispen-

sary and Massachusetts General Hospital. The teaching clinics were open to any registered physician in Massachusetts. It is hoped that these clinics will continue to be of service to those clinicians who desire to know more about the diagnosis and treatment of venereal disease.

In the autumn of 1940 a postgraduate library extension service was inaugurated, this project has been under the direct supervision of the Boston Medical Library. The references have been planned to supplement the postgraduate extension courses, so far there has not been time enough to finish all this service. Twenty bibliographies were completed, fifteen physicians requested loans of one or more sets of references. Dr. Henry R. Viets, the director believes that this service is worth while and that it should be enlarged and completed so that physicians may have clinical references readily available. This project has been started as a public health service and has been made possible by a grant of funds from the United States Public Health Service, on recommendation of the Massachusetts Department of Public Health.

Plans have been made for the New England Postgraduate Assembly to be given next fall on Wednesday and Thursday, October 29 and 30. The program is almost completed and will be published early in September. The list of speakers is as follows:

- Dr. Frank E. Adair, New York City (gynecology)
- Dr. J. Burns Amberson, New York City (tuberculosis)
- Dr. J. J. Bloomfield, Washington, D. C. (industrial medicine)
- Dr. William Darrach, New York City (fractures)
- Dr. John S. Lockwood, Philadelphia (chemotherapy)
- Dr. H. M. Marvin, New Haven (heart disease)
- Dr. William S. McCann, Rochester, New York (renal diseases)
- Dr. Damon B. Pfeiffer, Philadelphia (surgery)
- Dr. Homer F. Swift, New York City (rheumatic fever)
- Dr. George W. Thorn, Baltimore (endocrine disorders)
- Dr. Norris W. Vaux, Philadelphia (obstetrics)

These plans as well as the extension program are subject to change depending on the state of the national emergency.

FRANK R. OBER, *Chairman*
LEROI E. PARKINS, *Secretary*

APPENDIX NO 10

REPORT OF THE COMMITTEE ON INDUSTRIAL HEALTH

We are still working toward the end that all industry in the Commonwealth of Massachusetts, large and small, and all physicians directly or indirectly interested in those industries will receive special information regarding the health problems of industry.

Various methods have been used to present our case, particularly to the physicians. The *Journal* has been invaluable in presenting our cause, through the written reports of committee activities and also through published industrial medical case histories, and questions and answers about industrial medical problems.

The committee held monthly meetings throughout the fall and winter. The last meeting was on April 10 and is of particular interest because of the interesting group of invited guests. There were present an industrial executive as a representative of Associated Industries, a member of the Industrial Accident Board, a member of the Department of Labor, Division of Industrial Hygiene, two mem-

bers of the Harvard School of Public Health, a member of the United States Navy and two officers of insurance companies that handle workmen's compensation insurance. These guests were invited to acquaint them with the work being done by the Massachusetts Medical Society through this committee and also to get from them the ideas of the agencies that they represent and that should be vitally interested in our program.

The committee is at present tabulating statistics on all physicians in Massachusetts who are engaged in industrial medical practice to any extent. This work is being done for the Committee on Medical Preparedness of the American Medical Association.

W. IRVING CLARK, M.D., *Chairman*
LOUIS R. DANIELS, M.D., *Secretary*

APPENDIX NO 11

REPORT OF THE COMMITTEE ON THE ARMY MEDICAL LIBRARY AND MUSEUM

The chairman of this committee has been active in the last three months and on one occasion visited Washington and the Army Medical Library. With Surgeon General Magee, United States Army, and Colonel Jones, librarian of the Army Medical Library, various sites were inspected in Washington for the new building. A site was finally chosen on Capitol Hill and information has been received that the library will be erected there. A bill is now before Congress to purchase the land, the site having been authorized by the Planning Board of Washington. Your committee feels reasonably certain that the library will be erected on the proposed site and that building will be started within a year.

As there are likely to be matters coming up in the course of the next few years in regard to this project, it is hoped that the committee will be continued.

HENRY R. VIETS, *Chairman*
ROBERT B. OSGOOD
BENJAMIN SPECTOR

APPENDIX NO 12

REPORT OF THE COMMITTEE TO EQUALIZE DISTRIBUTION AMONG PHYSICIANS OF MEDICAL SERVICE TO WPA EMPLOYEES

In accordance with the plan reported to the Council on February 5, a member of our committee visited the WPA office in Boston each month. A listing of the total amount of fees each physician has received for this work has been completed. This listing covers the entire time the WPA has been in operation—about three and a half years. Some physicians have received more than \$3000 from the federal government during this period.

In order to start the equalization process, it is planned to remove from the list of available physicians all those who have received \$500 or more for this kind of service. There would be an important exception to this ruling, agreed on by the State Compensation Officer and your committee, namely, when an injured WPA employee has a family physician, he may still be allowed to go to him for treatment. The process of equalization of fees would necessarily be slowed by this means, but the principle of free choice seems of more importance. In this connection, it is essential that every means be taken

to prevent timekeepers and foremen from influencing the injured workman in his selection. Too much of that sort of thing has occurred in the past.

Certain physicians, by reason of the type of practice they have, tend to get more WPA patients than others. This appears inevitable, and so long as the physician selected is the family physician, our committee believes that it is just. Exact equalization of fees cannot be brought about.

One doctor has been overenergetic and particularly persistent in his attempt to get more WPA work. He has written repeatedly to the State Compensation Officer, describing his successful practice, his qualifications and his equipment. He complained that he was not receiving his share of the WPA cases at that time. He further stated that his income-tax returns would prove that he had the best practice in town. A check of the records in the WPA office revealed the fact that this complaining physician had handled more than one third of all the WPA injury cases in that town, and that he had received in fees nearly 50 per cent of all the money paid to the seven physicians in that town. He went so far as to request a hearing before the State Compensation Officer, and an appointment was given to suit his convenience. One of our committee inconvenienced himself to be present, but the complainant failed to appear, nor did he bother to explain his failure to appear. Needless to say, he was notified that no further WPA cases would be referred to him until a more equitable distribution had been arrived at.

In another district, sixteen physicians were removed from the listing because the money they had received greatly exceeded that received by all other physicians.

For your information, during the three and a half years of WPA operation in Massachusetts, \$1,047,401 has been spent for the care of approximately fifteen thousand injured workmen. The portion paid to physicians has not been totaled. Hospital charges are a big item.

Discussion of this report and suggestions by the Council would be welcomed by your committee.

GUY L. RICHARDSON, *Chairman*

APPENDIX NO. 13

REPORTS OF COMMITTEES APPOINTED TO CONSIDER RESTORATION TO FELLOWSHIP

Restoration to fellowship, with the usual provision regarding the payment of dues, was recommended for the following former members:

Bernard H. Appel, Brighton (Committee: Max Ritvo, David Stern and R. H. Aldrich).

Harold I. Cohen, Lynn (Committee: C. F. Twomey, Bernard Appel and C. L. Hoitt).

Frederick E. Cruff, Norwell (Committee: B. H. Peirce, R. F. Littlehale and Charles Hammond).

J. Frank Curtin, North Abington (Committee: J. H. Dunn, J. M. Peckham and Jonah Fieldman).

Leroy S. Ford, Keene, New Hampshire (Committee: S. N. Vose, H. L. Albright and W. H. Lacey).

Maurice Gerstein, Brookline (Committee: C. J. Kickham, E. L. Kickham and Albert Ehrenfried).

William R. Hill, Brookline (Committee: C. J. Kickham, J. A. Hennessey and R. J. Donovan).

Elihu I. Lewis, Boston (Committee: W. T. O'Halloran, M. D. Altschule and N. L. Fineberg).

Coval H. Liverpool, West Somerville (Committee: C. W. Finnerty, J. E. Gillis and Herbert Chelerton).

John L. O'Toole, Haverhill (Committee: W. W. Ferrin, L. R. Chaput and G. J. Connor).

Nathan Silverman, Lawrence (Committee: J. J. Deacy, J. J. Kelleher, Jr. and J. A. Levek).

Thomas V. Uniac, Lawrence (Committee: R. V. Baketel, V. A. Reed and H. F. Dearborn).

No action was recommended in regard to the petition of Anthony P. Carogana, Chelsea (Committee: W. J. Brickley, J. A. Smith and W. E. Garrey).

APPENDIX NO. 14

COMMITTEES APPOINTED TO CONSIDER PETITIONS FOR RESTORATION TO FELLOWSHIP

The following committees were appointed to consider the petitions for restoration to fellowship of the following two former members.

For Edward C. Messer, Dorchester:

W. J. Walton, D. J. McSweeney and J. J. Meehan.

For Nathan Pulsifer, Lowell:

A. R. Gardner, D. J. Ellison and H. W. Jewett.

APPENDIX NO. 15

RESOLUTION PRESENTED BY DR. MICHAEL A. TIGHE

WHEREAS, Throughout the greater part of the United States the application of medical knowledge and skill to the needs of justice is seriously impaired because medicolegal investigations of the cause and circumstances of deaths are conducted under the quasijudicial political office of county coroner; and

WHEREAS, the Commonwealth of Massachusetts, due largely to the efforts of the Massachusetts Medical Society, was the first state in the United States and for that matter the first community in the English-speaking part of the world to abolish the coroner's office and replace it by that of medical examiner; therefore, be it

RESOLVED, that the delegates of the Massachusetts Medical Society to the forthcoming meeting of the American Medical Association in Cleveland be instructed to recommend to the House of Delegates that it appoint a committee of three, to be known as the Committee on Legal Medicine, and that the aforesaid committee be instructed:

To survey the manner in which legal medicine, so far as it is concerned with the activities of the coroner's office, is being practiced in various parts of the United States;

To consult with the Medicolegal Committee of the American Bar Association to determine how best to improve the practice of legal medicine; and

To acquire and make available to the medicolegal committees of the various state medical societies such information as may be useful to them in their efforts to abolish or improve the coroner system in their respective states.

MEDICAL PROGRESS

DIAGNOSTIC ROENTGENOLOGY

The Flat Film of the Abdomen; Myelography: Air versus Iodized Oil;
Fibrocystic Disease of Bone

RICHARD SCHATZKI, M.D.*

BOSTON

THE FLAT FILM OF THE ABDOMEN

THE flat film has for many years played an important role in the examination of the abdominal organs. Owing to many technical improvements, the quality of such films has greatly improved in recent years, and this has simultaneously broadened the scope of the roentgenologist.

No other single x-ray film gives so much information as the flat film, which reveals not only the disseminated or generalized bone diseases, such as metastatic tumors, diffuse osteoporosis and Paget's disease, but also a vast variety of soft-tissue abnormalities. It is impossible to include them all in this review, for a casual count shows that more than a hundred conditions are at times diagnosable by these films. Hence, this report is limited to the non-skeletal parts of the abdomen, and emphasizes those conditions to the diagnostic significance of which clinicians have hitherto paid insufficient attention, as well as those subjects to which recent contributions have been made. No attempt will be made to quote the literature in detail.

A few words about the preparation of the patient are in order, since an adequate examination of the abdomen is rendered impossible by an incompletely emptied colon or a partially filled bladder. The patient should have, unless it is contraindicated, a good cathartic, preferably castor oil, as well as a cleansing enema. Pitressin may be useful in emptying the bowel. The patient should void before the films are taken.

In a review of this subject it may be worth while to remember the elementary fact that x-rays differentiate objects adjacent to each other only if the objects are of different translucency to the rays. Generally speaking, there are only four different densities to x-rays in the body. Arranged in groups, from the densest to the lightest, they are: calcified areas, including bone; all soft tissues, excluding fat, and all body fluids, excluding chyle; fat and chyle; and air and other gases. An organ becomes visible only if the adjacent tissue belongs to a group above or below its own x-ray density.

The Spleen

In most flat films of the abdomen, the lower edge of the spleen, as well as parts of its lower medial border, is visible. Occasionally, the upper part of the medial border is seen within or medial to the air-filled stomach. Statistics on the exact size of the normal x-ray shadow of the spleen do not exist, to my knowledge, but in the daily clinical routine the roentgenographic determination of the size of this organ has proved reliable.

Enlargement of the spleen is usually readily seen on a flat film. This fact can be utilized clinically, particularly in cases in which the determination of the size of the spleen by percussion and palpation is rendered difficult or doubtful. The characteristic shape of the x-ray shadow of the spleen has proved useful in cases in which it was clinically doubtful whether a mass in the left upper quadrant represented the spleen. A lateral flat film may be of particular help in such a case.

The Liver

The superior surface of the liver is clearly shown by the position of the diaphragm. Its lower edge can be seen in contrast with the adjacent colon or small intestine on most flat films, thus outlining the size of this organ. Pfahler¹ described special studies on the x-ray measurements of the liver. Although an exact interpretation of liver size is made difficult by its distortion or by any unusual tilt of the organ, gross changes in its size are readily recognizable if the lower edge is visible. Marked anomalies in the shape of the liver, as produced by syphilitic lobulation or by large primary tumors, may be seen on the flat film. Superficial lobulation, produced by metastasis, is not visible.

Liver abscesses may produce no change from the normal appearance in the flat film. On the other hand, multiple abscesses may cause a generalized enlargement of the organ, and some liver abscesses may produce a localized lobulation of the diaphragm. In such cases, fluid may be found in the costophrenic angle. Gas formation in an abscess can be easily demonstrated, especially if a fluid level is shown by using some view with horizontal direction of the x-rays. Calcification occasionally occurs in old abscesses.²

All articles in this series will be published in book form the current volume is *Medical Progress: An annual, 1940* (Springfield Illinois: Charles C. Thomas Company 1941 \$4.00)

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The diagnosis of infection within the bile ducts is at times difficult clinically. It is, therefore, of interest that Berg³ recently described 4 cases in which, owing to the action of gas-forming bacilli, a more or less extensive demonstration of the bile-duct system occurred on the flat film. More commonly, air filling of the bile ducts is produced by an abnormal postoperative or spontaneous communication of the bile ducts with the gastrointestinal tract. If the communication is spontaneous, it is in rare cases due to an eroding peptic ulcer or neoplasm, but usually it is produced by the penetration of a gallstone. Air in the bile ducts, if found in a patient with ileus, is highly suggestive of gallstone ileus, even though the obstructing stone itself cannot be demonstrated within the distended air-filled and fluid-filled loops of intestine.⁴

The Pelvic Organs

The use of the flat film in the study of pelvic disease is important, but not generally appreciated. Whereas at times the flat film may merely reveal the presence of some abnormality of the pelvic organs, at other times a definite diagnosis can be made. To state whether a pathologic soft-tissue mass is malignant or benign, or inflammatory, or indeed, to name its true origin, may at times be extremely difficult. Nevertheless, the value of the film is manifest by the esteem that experts in manual examination have for it. Needless to say, a particularly well-cleansed rectum and sigmoid and an empty bladder are necessary for a successful visualization of these organs. Films with varying tilts of the x-ray tube may prove helpful.

On a good film the normal uterus is usually visible as an ovoid shadow caused by the projection of the anteflexed organ. Fibroids produce uterine enlargement, usually eccentric; in later years they are commonly calcified. Large intramural fibroids may produce a symmetrical enlargement of the uterus, simulating pregnancy and differing only in the absence of fetal bones. Similarly, it may be difficult or at times impossible to differentiate large ovarian cysts from such fibroids. To diagnose carcinoma of the uterus is not possible, but the flat film may give helpful information of the extent of parametrial involvement in advanced cases.

Inflammation within the parametrial tissues often produces a localized disappearance of the uterine outline. In acute or subacute processes, the pelvic subperitoneal fat layer, which is normally clearly visible on flat films, becomes edematous in the inflammatory area, and hence invisible. Abscesses can be seen as a more or less diffuse density filling the pelvic cavity, and at times may have an appearance that is difficult to distinguish from that of tumor.

Normal ovaries are occasionally seen on flat films. Ovarian cysts produce localized, round, soft-tissue shadows, the size of which shows great variation. Even small cysts may be seen on flat films, and not infrequently such cysts have proved to be palpable only at a second manual examination, after their presence had been suggested by the x-ray film.

Other ovarian tumors may produce shadows of varying size and shape, and some of them are definitely diagnosable by the flat film. Dermoids not infrequently contain incompletely developed teeth or bones. A correct differentiation from teratomas may be impossible; however, a diagnosis of dermoid may be possible even in the absence of calcified masses.⁵⁻⁷ This is because dermoids contain sebaceous material, which is more translucent than the capsule, thus producing the x-ray appearance of a "radiolucent tumor."

Cystadenoma and cystadenocarcinoma of the ovary are often identifiable by the presence of small calcified psammoma bodies, large enough to be visible on flat films. These areas of calcification may betray the presence of ovarian tumors at a preclinical stage⁸; in tumors of long standing the calcifications may become very diffuse, filling large portions of the abdominal cavity. On the other hand, even large cystadenomas may exist without visible areas of calcification.

Inflammatory and neoplastic soft-tissue masses arising in the bony pelvis are usually easy to recognize.

This description of the possibilities of the flat-film examination of the pelvis should not produce an exaggerated impression of its practical value. The presence of many of the processes mentioned certainly cannot be excluded if they are not visible on the film, nor is a roentgenologic differential diagnosis possible in many cases in which disease is visible.

The Retroperitoneal Organs

The normal retroperitoneal space offers a fairly characteristic appearance on the flat film, an appearance created by the fat that surrounds the kidneys and the retroperitoneal muscles (psoas and lumbosacral muscles). As previously noted, fat is of a different density to x-rays than other soft tissues, and for this reason these organs are made visible on the flat film by the fatty tissue surrounding them. Thus, the retroperitoneal organs of an obese person are better visualized than those of a thin person. Any localized disappearance of the retroperitoneal outlines suggests disease in this area, whereas a generalized loss of outline occurs in the presence of extensive disease within the abdomen, such as massive ascites or a large ovarian

tumor. Here again, the adequate preparation of the patient is of paramount importance, since air or fecal material may seriously obscure the retroperitoneal structures.

A localized space consuming process in the retroperitoneal tissue, whether tumor, abscess or hematoma, produces a homogeneous soft tissue shadow obscuring the normal retroperitoneal outlines. The differential diagnosis between the three conditions may at times be impossible, but usually the position of the mass and the sharpness and shape of its edge, as well as the presence and structure of calcification within or around it, permit a fairly accurate diagnosis.

Gas in the retroperitoneal spaces may be due to gas producing bacilli, or more rarely to retroperitoneal perforation of the duodenum or colon. The development of fat necrosis presents a peculiar mottled appearance.

The Pancreas

Although the normal pancreas is not visible on the flat film, Engel and Lysholm⁹ have estimated its approximate size by measuring on a lateral film the distance between the air-distended stomach and the spine. This distance they found increased in cases of pancreatic enlargement. Case,¹⁰ who recently reviewed the roentgenology of pancreatic disease, recommends the method.

Pancreatic cysts, with their characteristic round shape, are usually readily visible on a flat film. Occasionally large pancreatic carcinomas can be seen on flat films, but the roentgenologist must be content to diagnose a retroperitoneal tumor, perhaps venturing a guess at its pancreatic origin based on its location and its effect on the position of the kidneys.

On the whole, the flat film examination of the pancreas is still unsatisfactory.

The Kidneys

The kidneys are seen on most good flat films because of the fatty tissue surrounding them. Although normal kidneys vary greatly in size, pathologic variations in size are usually recognizable, such as small shrunken or large polycystic kidneys. Tumors and solitary cysts produce a localized enlargement of the kidney, and are usually impossible to differentiate on the flat film. If a tumor or cyst protrudes only slightly from the kidney surface, it may simulate a congenital lobulation of the kidney, an anomaly of no significance.

Renal stones are the commonest cause of calcification within the kidney outline, a detailed discussion of stones is beyond the confines of this report. Linear areas of calcification in a charac-

teristic arrangement within the pyramids of the kidneys represent calcium casts of the tubules, and are highly suggestive of the greatly increased calcium excretion found in hyperparathyroidism.¹¹ Calcifications in tuberculous abscesses of the kidneys are usually very characteristic, whereas the occasional calcifications in tumors are of less diagnostic significance.

The importance of the flat film in the diagnosis of perinephritic abscess has been emphasized for years. The most characteristic change is that of a localized disappearance of retroperitoneal structures (kidney shadow and psoas shadow). Scoliosis, elevation of the diaphragm and displacement of the kidney shadows are other signs found in this condition. Hemorrhage around the kidney may simulate the picture of perinephritic abscess; the changes, however, are usually more extensive. In cases of subcapsular hemorrhage, the involved kidney may remain clearly visible, with its shadow greatly enlarged.

The Adrenal Glands

Normal adrenal glands are not seen on the flat film. Tumors become visible only after they have reached large dimensions. In Addison's disease, the adrenal glands may be calcified, and I know of cases of previously unsuspected Addison's disease that were diagnosed first by the characteristic x-ray appearance of the calcified glands. On the other hand, such calcification does not necessarily establish the diagnosis of Addison's disease, because it is sometimes seen in the absence of adrenal insufficiency.

The Peritoneal Cavity

The value of the flat film for demonstrating air in the peritoneal cavity is well known. This examination is widely used whenever there is a question of a perforated viscus. The absence of demonstrable air does not, however, exclude the presence of such a perforation.

Large amounts of fluid in the abdomen are usually easier to ascertain clinically than by the use of the flat film. This film may, however, be of great assistance in differentiating large ovarian cysts and ascites. The characteristic displacement of air-filled bowel by the ovarian cyst usually permits a prompt diagnosis.

Diffuse peritonitis usually produces early paralytic ileus. In this condition, fluid may be seen to separate the dilated air-filled intestinal loops.

Localized intraperitoneal abscesses become visible if they contain gas. If they are large enough, they produce a homogeneous soft tissue shadow, which may be visible as such, for example, in the region of the appendix or in the pelvis. Laurell¹²

has shown how essential it is to watch for a disappearance of the normally visible subperitoneal fat layer in all those cases in which the abscess is close to the abdominal wall.

The Stomach

The air-filled and fluid-filled stomach is often seen on the flat abdominal film, a fact that must be known only to avoid misinterpretation. Cancer of the fundus may be visible on the flat film if the tumor deforms the gas bubble of the stomach, particularly on a film taken in the upright position. Recently a rare case of extensive calcification in a scirrhous carcinoma involving the greater part of the stomach has been reported.¹³ Usually, however, the flat film is of little or no help in the diagnosis of cancer of the stomach.

The Intestines

One of the most important functions of the flat abdominal film is the assistance it offers in the diagnosis of mechanical and paralytic ileus. The characteristic dilatation of air-filled and fluid-filled loops of small and large intestine becomes visible within six hours after the onset of the pathologic process.¹⁴ The roentgenographic appearance of ileus has been described in many excellent papers,^{15, 16} and it will not be further discussed here. The value of the flat film in these cases cannot be overestimated, but it should be emphasized that in most cases the differential diagnosis between mechanical and paralytic ileus is not possible.

The advantage of flat-film examination in cases of intussusception and volvulus has been stressed in recent papers.^{17, 18} A definite diagnosis of these conditions can often be made by this method.

Tumors of the small intestine commonly assume large dimensions and become visible on flat films. They often contain large irregular gas-filled cavities with a characteristic appearance.¹⁹

Miscellaneous

This report has not mentioned a large number of conditions in which the flat film may be helpful. Among them are gallstones, hydrops of the gall bladder, pancreatic stones, calcified mesenteric lymph nodes, kidney, ureteral and bladder stones, parasites (echinococcal cysts and cysticercosis), pregnancy, pneumatosis cystoides intestinalis, tuberculosis of the seminal vesicles, tuberculous or osteomyelitic paravertebral abscesses, mesenteric cysts, abdominal neuroblastomas and calcification and aneurysm of the abdominal aorta or its branches.

These conditions are referred to by name only because a complete discussion is impossible, not because the flat film is considered to be of less importance in these conditions. As a matter of fact,

in some of these abnormalities the study of the flat film has become a specialty within the specialty of roentgenology, for example, in the study of the appearances of early and late pregnancy.

To summarize the value of the flat film in one sentence, one may say that it allows a definite diagnosis to be made in a fair number of conditions, but that in an even greater number it focuses the attention of the examiner on a certain region of the abdomen and indicates in which direction further examination should go.

MYELOGRAPHY: AIR VERSUS IODIZED OIL

Progress in the x-ray examination of lesions of the spinal canal in the last two decades is intimately connected with the introduction of iodized oil (lipiodol) as a contrast substance. Small tumors that are not seen in simple roentgenograms become visible as defects in the column of oil; progress in the recognition of even smaller lesions, such as ruptured intervertebral disks, has recently been reviewed.²⁰

The introduction of iodized oil into the lumbar canal has, however, met with opposition ever since it was first recommended. The literature of the last fifteen years is filled with controversial evidence proving or disproving the harmfulness of the injected oil. This controversy has lately been reviewed.²¹

In recent years, the use of air or oxygen has been recommended as a substitute for iodized oil in the examination of the spinal canal. Chamberlain and Young²² have shown the method to be effective in demonstrating encroaching lesions, and their report has stimulated similar studies in other clinics. The special value of the method lies in the fact that the gases are rapidly absorbed, leaving no residue in the canal. The results of such studies have shown uniformly that a positive finding in an air myelogram is of diagnostic importance,²³ although not quite so reliable as a defect demonstrated by lipiodol.²⁴ A normal air myelogram was, however, found to be of very little significance, inasmuch as succeeding lipiodol injections often revealed pathologic processes. It therefore became necessary in cases in which the air myelogram had been negative to do a second examination with oil, and in these cases it was found that the second test was rendered less effective by the previous air injection.

The main drawback of iodized oil has been the fact that it remains indefinitely in the subarachnoid space after injection. This has always been the target of attack of those who condemn the use of oil, and it has produced some uneasiness in those who have continued using it. It has always been striking to me to see how freely the oil moves in

the subarachnoid space even many years after its injection, a finding that argues against any markedly irritating quality of the substance. Garland and Morrissey²⁵ recently re-examined 25 patients several months or years after the injection of 2 to 5 cc. of lipiodol, finding not only that the oil was still present in all cases, but that in two thirds it was discovered in the cerebral cavity. In spite of this, neurologic examinations showed that in none of the cases were there symptoms or signs that had not been present prior to the injection or could be attributed to the presence of the oil. It is interesting to note that undesirable effects have been particularly unusual in those clinics in which lipiodol has been used extensively. Hence, although gases are readily absorbed after air myelograms, the diagnostic value of the examination has been markedly limited. On the other hand, the use of lipiodol has given good results, but the oil has remained in the spinal canal indefinitely, unless removed at a subsequent operation. In search of an ideal contrast substance, Thorotrast has been tried, but reports about its practical usefulness are still wanting.

An unexpectedly simple solution of the problem has been described in a recent paper by Kubik and Hampton.²⁶ These authors have outlined a method that makes it possible to remove lipiodol from the spinal canal through an 18-gauge needle, after the examination has been completed. The patient is placed horizontally, face down, on a fluoroscopic table. A lumbar-puncture needle is introduced into the third lumbar space, with the patient still in the prone position. The oil is injected and the needle left in place during the fluoroscopic examination, which follows immediately. At the end of the roentgenologic examination, the oil is brought into the region of the needle tip by tilting the table and is withdrawn by gentle suction with a small syringe. By tilting the table, under fluoroscopic control, any remaining oil is brought to the point of the needle and removed. Since small droplets of oil may not be visualized with the fluoroscope, a film is taken before the needle is withdrawn, to make sure that removal of the oil has been as complete as possible.

This simple procedure has proved successful in the hands of the authors in over 50 cases. Some experience and strict adherence to a few rules mentioned by them make for successful removal of injected lipiodol. In principle, this method has disposed of the main objection to the use of iodized oil. It is obvious that lipiodol examinations of the spinal canal should not be performed unless definitely indicated, but there is reason to believe that an oil examination, if performed as described

above, is no more dangerous than a lumbar puncture.

FIBROCYSTIC DISEASE OF BONE

The diagnosis and classification of fibrocystic lesions of the bones has been, and still is to some extent, a rather difficult enterprise.

A bone cyst should be a well-defined bag containing fluid, if one uses the word "cyst" as in other parts of the body. Only a few bone lesions that clinically and roentgenographically are called "cysts" fulfill this strict definition. Many of these contain blood clots or living tissue, with or without the fluid mentioned above.

Roentgenographically it is impossible to see any difference between the density or structure of a fluid-filled bone cyst and that of a cyst containing fibrous or other soft-tissue masses. It seems necessary to recognize this difficulty, although it appears of questionable value to confine the use of the word "cyst" to the strict definition given above.

The classification of these bone lesions, at first purely on a descriptive basis, led to a great deal of confusion, because of the numerous syndromes named and because the etiology of such lesions remained unknown. With the advent of accurate etiologic information in only a few of these conditions, the number of bone-cyst syndromes has been markedly diminished, and the confusion considerably cleared.

The most revealing discovery was the establishment of an etiologic relation between several types of bone cysts and hyperfunctioning states of the parathyroid glands. Ever since von Recklinghausen described cases of osteitis fibrosa cystica generalisata, with multiple cystlike areas scattered throughout the skeleton, this peculiar condition has puzzled roentgenologists, anatomists and clinicians. These areas may be in the medullary part of the bone, but more commonly are in the cortex. Histologically they represent either giant-cell tumors or cysts. They may be single, but are often multiple. In addition to these lesions there usually is severe generalized decalcification of the whole skeleton. This combination of cystlike areas and decalcification produces a characteristic x-ray appearance.^{27, 28} Blood chemical studies show the well-known disturbance of calcium metabolism, with a high serum calcium, a low serum phosphorus and a high serum phosphatase.

The relation of this disease to hyperfunction of the parathyroid glands was postulated many years ago, but not until Mandl cured a patient with osteitis fibrosa cystica generalisata by removal of a parathyroid tumor was this proved. The clinical entity has since been worked out in many excellent papers.²⁹

The successful explanation of osteitis fibrosa cystica generalisata prompted further attempts at explaining other cystic bone lesions as being due to a hyperfunction of the parathyroid glands or other endocrine organs. All these attempts have failed. Although a definite etiology has not been found for other bone cysts, another syndrome connected with fibrocystic bone disease has been established in recent years.

In 1937, Albright and his associates³⁰ described a syndrome in which cystlike areas in various bones play an important role. The syndrome consisted of multiple bone lesions with a marked tendency to be unilateral and with the histologic picture of osteitis fibrosa, round, nonelevated pigmented areas on the skin, which tended to be on the same side as the bone lesions, and endocrine dysfunction, which in females was associated with precocious puberty.

Albright and his associates deserve credit for emphasizing the combination of the abnormalities mentioned above as representing a characteristic and not too uncommon entity, although lesions similar to those considered by them had been described, mainly in case reports, in previous years under various names (localized osteitis fibrosa, focal osteitis fibrosa, osteodystrophia fibrosa unilateralis and so forth).

The bone lesions are of interest and importance. In most cases several bones are involved, the distribution of the disease being spotty and the uninvolved bones appearing normal. The lesions have a tendency to be regional and are consequently often unilateral, although not necessarily so. The bones in the involved areas are either slightly or markedly increased in size, with cystlike areas of rarefaction varying in size and shape and involving both cortex and medulla, in long as well as in flat bones. The epiphyses often escape involvement. Precocious bone age and early union of the epiphyses are part of the syndrome. The skull is commonly involved, particularly the frontal and occipital bones. Usually the cystlike areas fade out gradually, whereas others are well defined. The involved bone may be increased but is more commonly decreased in density, with a characteristic absence of trabeculae in a large portion of the bone. The bone looks as if one had made a sketch of the trabeculae with a pencil and had then rubbed out the trabeculae with the finger, leaving the smudge. The description of the lesion is more difficult than the actual appearance warrants. Once seen, they are fairly easily recognized. There is no generalized decalcification, and the uninvolved bone appears normal, in contradistinction to the lesions of hyperparathyroidism. For this

reason the bone lesions are said to be disseminated, not generalized.

Blood chemical studies show the serum calcium and phosphorus to be within normal limits. Urine calcium is not elevated, as in hyperparathyroidism. Cases with very advanced bone changes may have an elevated serum-phosphatase level.

Anatomically there are no fluid-filled cysts, but a tough fibrous tissue is found. An excellent colored picture of a skull lesion, exposed during operation, has been recently published.³¹ Histologically, osteitis fibrosa is present. Osteoclasts, however, are infrequent in comparison to the findings in hyperparathyroidism.

The etiology of the syndrome is unknown, and this fact has caused Albright and his associates to refrain from naming the disease; others have recently called it "polyostotic fibrous dysplasia."³² It does not appear to be a primary endocrinopathy. Albright has suggested the presence of an early, possibly a congenital, neurologic anomaly.

The roentgenologist plays an important role in the recognition of these cases, inasmuch as the majority of them are first seen by him, following a pathologic fracture of one of the involved bones. Unless he is acquainted with the syndrome, a series of unnecessary and dangerous procedures may follow. The lesions may be treated as bone tumors, and mutilating operations have been performed. The similarity of some of the described areas to those of hyperparathyroidism has occasioned exploration of the parathyroid glands, obviously with a negative result.

The classification of fibrocystic disease in bones has been greatly clarified by the recognition of two distinct groups: osteitis fibrosa cystica generalisata, due to hyperparathyroidism, and osteitis fibrosa cystica disseminata, as part of Albright's syndrome.

Although the etiology of the latter condition is not known, its general characteristics put it in a group similar to neurofibromatosis. There still remain single bone cysts and giant-cell tumors, the etiology and even the classification of which have not been settled, in spite of many explanatory theories.

REFERENCES

1. Pfahler, G. E. Measurement of liver by means of roentgen rays based upon study of 502 subjects. *Am. J. Roentgenol.* 16:558-564, 1926.
2. McCullough, J. A. L. and Sutherland, C. G. Intra-abdominal calcification: the interpretation of its roentgenologic manifestations. *Radiology* 36:450-457, 1941.
3. Berg, H. H. Gasfüllung der Gallenwege. *Fortschr. a. d. Geb. d. Röntgenstrahlen* 61:1-9, 1940.
4. Bormin, C. N. and Rigler, L. G. Spontaneous internal biliary fistula and gallstone obstruction, with particular reference to roentgenologic diagnosis. *Surgery* 13:349-378, 1937.
5. Laurell, H. Ein Beitrag zur Röntgenologie der echten Mischgeschwülste des Rumpfes. *Acta radiol.* 1:406-417, 1922.
6. Danellus, G. A neglected sign for roentgenologic diagnosis of intra-abdominal dermoid cyst. *Am. J. Obst. & Gynec.* 38:348-350, 1937.

- 7 Robins S A and White G Roentgen diagnosis of dermoid cysts of the ovary in the absence of calcification *Am J Roentgenol* 43 30 34 1940
- 8 Lingley, J R The significance of psammoma calcification in the diagnosis of ovarian tumors *Am J Roentgenol* (in press)
- 9 Engel, A and Lysholm E New roentgenological method of pancreas examination and its practical results *Acta radiol* 15 635 651 1934
- 10 Case J T Roentgenology of pancreatic disease *Am J Roentgenol* 44 155 158 1940
- 11 Eitinger A, and Magendanz, H Roentgen evidence of extensive calcification of kidneys in osteitis fibrosa cystica *Am J Roentgenol* 31 593 596 1934
- 12 Laurell H Acute abdominal cases chiefly from roentgenological point of view *Acta chir Scandinav* 66 105 132 1930
- 13 Abel W Zur Diagnose der Magenwandverkalkungen *Fortschr a d Geb d Röntgenstrahlen* 59 57 64 1939
- 14 Swenson P C and Hubbard J S Roentgenographic manifestations of intestinal obstruction *Arch Surg* 25 578 600 1932
- 15 Case J T Roentgenological aid in diagnosis of ileus *Am J Roentgenol* 19 413 425 1928
- 16 Mitnick L S and Sarris S P Acute mechanical obstruction of the small bowel its diagnosis and treatment *New Eng J Med* 222 611 622 1940
- 17 Schatzki, R Roentgenologic appearance of intussuscepted tumors of colon with and without barium examination *Am J Roentgenol* 41:519 563, 1939
- 18 Rugler, L G and Lipschultz O Roentgenologic findings in acute obstruction of colon with particular reference to acute volvulus of sigmoid *Radiology* 35 534 543, 1940
- 19 Lingley, J R Non obstructing malignant tumors of small bowel *Am J Roentgenol* 36 902 909 1946
- 20 Schatzki R Diagnostic roentgenology *New Eng J Med* 220 47 752 1939
- 21 Garland L H The effect of iodized oil on the meninges of the spinal cord and brain *Radiology* 35 467 476 1940
- 22 Chamberlain W E, and Young B R Air myelography in diagnosis of intraspinal lesions producing low back pain and sciatic pain *Radiology* 33 695 700 1939
- 23 Poppen J L The use of oxygen in demonstrating posterior herniation of intervertebral disks *New Eng J Med* 223 978 982 1940
- 24 Hampton A O Iodized oil myelography use in the diagnosis of the rupture of the intervertebral disk into the spinal canal *Arch Surg* 40 444 453 1940
- 25 Garland L H and Mortensen E J Intracranial collection of iodized oil following lumbar myelography *Surg, Gynec & Obst* 70 196 210 1940
- 26 Kabak C S and Hampton A O Removal of iodized oil by lumbar puncture *New Eng J Med* 224 455 457, 1941 Also unpublished data
- 27 Dresser, R and Hampton A O Osteitis fibrosa cystica generalisata with hyperparathyroidism as etiology *Am J Roentgenol* 25 730 748 1931
- 28 Camp, J D Roentgenologic changes in metastatic diseases of bone *Radiology* 26 393-408 1936
- 29 Albright F, Aub J C and Bauer, W Hyperparathyroidism a common and polymorphic condition as illustrated by 17 proved cases from one clinic *J A M A* 102 1276 1287 1934
- 30 Albright F, Butler A M, Hampton A O and Smith P Syndrome characterized by osteitis fibrosa disseminata areas of pigmentation and endocrine dysfunction with precocious puberty in females *New Eng J Med* 216 727 746 1937
- 31 Moehlig R C and Schreiber F Polyostotic fibrous dysplasia report of a case with unilateral involvement *Am J Roentgenol* 44 17 23, 1940
- 32 Lichtenstein, L Polyostotic fibrous dysplasia *Arch Surg* 36 874 898, 1938

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED
IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27261

PRESENTATION OF CASE

A thirty-seven-year-old Italian barber was admitted to the hospital complaining of weakness, fever and shortness of breath of three months' duration. Seventeen years before, at the age of twenty, the patient had a penile sore and was given a single intravenous injection. He had no further symptoms until five years before admission, when shooting pains developed in his legs. Diagnoses of neurosyphilis, syphilitic aortitis and aortic regurgitation were made, and treatment consisting of intramuscular bismuth, mercury and iodides was instituted. Spinal-fluid Wassermann and blood Hinton reactions were said to have been positive at this time. The patient continued to have occasional lightning and girdle pains, and these recurred with more severity in the three months prior to admission. At this time he developed "flu," with a nonproductive cough and loss in weight, appetite and strength. For six weeks he had noticed showers of painless red spots over his lower extremities, all of which had disappeared at the time of admission. Bouts of fever, spiking to 102°F., occurred in the afternoon and evening; they were accompanied by sweating, without chills. In addition he had noted increased nocturnal breathlessness, amounting to orthopnea, and, for two weeks, swelling of his ankles and fleeting joint pains in his knees, ankles and elbows.

The family history was negative. The patient had had scarlet fever and perhaps measles in childhood, and at the age of fifteen was told by his physician to stay in bed for six months. The patient's wife and nine-year-old child were well and gave no serologic evidence of syphilis.

Examination showed a thin, poorly nourished, pale, acutely ill man with no petechiae or clubbing of the fingers. The right pupil was large and fixed, and the left miotic and fixed to light but not to accommodation. The fundi were not remarkable. There was no venous distention, but the arterial pulsations were forceful. The apex impulse was maximal in the sixth left interspace just beyond the anterior axillary line, 11.5 cm. to the left of the midline and 3.5 cm. to the left of the midclavicular line. In the third interspace dullness extended 7 cm. to the left of the midline.

The right border of dullness was 4 cm. from the midline. Rhythm was regular at a rate of 90 to 110. The first sound was replaced by a harsh systolic murmur heard all over the precordium but maximal in the second and third left interspaces, where a faint, short, early diastolic blow was also audible. A systolic thrill was palpable in the third and fourth left interspaces, and faintly over the supraclavicular vessels. A "pistol-shot" was heard over the brachial artery. One observer heard no second heart sound, but another recorded the aortic second sound as present and equal to the pulmonic. The blood pressure in the right arm was 150 systolic, 50 diastolic, and in the left, 125 systolic, 60 diastolic. The liver and spleen were enlarged to percussion but not palpable (the patient would not co-operate on abdominal examination). Rectal examination was negative. The deep reflexes were equal and active, and the vibration and position senses were intact. In the Out Patient Department three weeks before admission, purpuric spots had been noticed over the patient's legs.

The temperature was 100°F., the pulse 90, and the respirations 22.

The urine was acid, with the specific gravity ranging from 1.004 to 1.015; there was a ++ test for albumin, and the sediment contained two or three red blood cells, five or six white blood cells and occasional granular casts per high-power field. The stools were normal. The blood showed a red-cell count of 4,000,000 with a hemoglobin of 8 gm. (photoelectric-cell technic), and a white-cell count of 7000 to 12,000; a smear showed microcytosis, anisocytosis, poikilocytosis and hypochromia. The corrected sedimentation rate was 1.1 mm. per minute. Two blood cultures showed no growth. The van den Bergh was normal, the nonprotein nitrogen 56 mg., the serum protein 6.9 gm. per 100 cc., and the carbon dioxide combining power 18.4 milliequiv. per liter. The blood Hinton and Wassermann reactions were positive, as was the spinal-fluid Wassermann reaction. The spinal-fluid protein was 26 mg. per 100 cc.; there were two lymphocytes per cubic millimeter, and the gold-sol curve was 5555331100.

An x-ray film of the chest showed marked enlargement of the left ventricle; the lung fields were clear. On fluoroscopy, the aorta showed water-hammer pulsations.

An electrocardiogram in the Out Patient Department showed no abnormal axis deviation or rhythm but a prominent S₁. A second tracing suggested digitalis effect, with a bizarre QRS₄.

The patient was very sick, ran an irregular temperature from 100 to 103°F. and was troubled

by severe epistaxes and recurrent hiccoughs. Small amounts of sulfathiazole were given, and the blood level reached 2 to 4 mg. per 100 cc. The bladder became enormously distended; foot and ankle edema persisted, and he was given digitalis and sodium citrate, the latter to correct the mild acidosis. Blood chemical studies showed continuing acidosis, with a calcium of 7.6 mg., a phosphorus of 1.9 mg. and a phosphatase of 2.2 Bodansky units per 100 cc. The plasma vitamin C was 1.1 mg. per 100 cc. A protein fractionation showed 1.7 gm. of albumin and 6.0 gm. of globulin per 100 cc.

While on sulfathiazole the patient's temperature fell to normal and remained so for three days after the omission of the drug. Nevertheless he steadily failed and died suddenly on the nineteenth hospital day.

DIFFERENTIAL DIAGNOSIS

DR. HOWARD B. SPRAGUE: In this case it seems as if we should have to start out with a diagnosis at the beginning and try to defend it. I think the story of the immediate illness is quite characteristic of subacute bacterial endocarditis, with what was called "flu," cough, loss of strength, showers of "red spots," fever, chills, sweating, beginning congestive failure, joint pains, two or three red cells in the urinary sediment, anemia and increased sedimentation rate; but we have not the confirmatory evidence of a positive blood culture. It does not seem as if this were the major cause of the cardiac findings. In other words this did not start *de novo* and cause the various murmurs in the heart. There was some other underlying cardiac lesion.

Of course it would be easy to take the diagnoses that had been made a year before, when he came in and was treated for syphilis. Aortic regurgitation was found at that time, and the diagnosis of syphilitic aortitis was made. The combination of syphilitic aortitis and aortic regurgitation complicated by bacterial endocarditis is very rare, although it does occur. On looking through the literature I found there had been only 5 cases reported up to 1938; 5 more were reported that year. I was rather struck with the fact that, at least in these cases, the picture was one of a free aortic regurgitation or else there was no aortic regurgitation but a bacterial invasion of the aorta above the aortic valve, sometimes with perforation. I do not know what the figures show in this hospital, but I can recall very few cases that I have seen personally in which syphilis was the underlying lesion for a *Streptococcus viridans* infection. That in itself perhaps draws me somewhat

away from a diagnosis of a syphilitic lesion of the aortic valve.

By far the commonest lesion is rheumatic, and one can distort the evidence to his own purposes in building up the diagnosis of a rheumatic lesion of the aortic valve. The patient had scarlet fever in childhood, and this must be considered as evidence of some sort of streptococcal infection. We believe nowadays that, if a person has rheumatic heart disease following scarlet fever, he had rheumatic fever at the time he had the scarlet fever. This patient was told to go to bed for six months when he was fifteen years old. I do not know just why a doctor might tell a fifteen-year-old boy to go to bed for six months, but I should think it might have been the finding of something wrong with his heart. There is the suggestion that he had rheumatic infection.

On physical examination he had a harsh systolic murmur replacing the first sound, maximal in the second and third spaces, but they noted only a faint diastolic blowing murmur. Although I get the impression that this man had rather marked arterial pulsations, the description of the cardiac findings is not that of the characteristic loud to-and-fro aortic regurgitation of syphilis. There was a systolic thrill felt in the third and fourth interspaces and in the supraclavicular vessels. That is, of course, suggestive evidence of some degree of obstruction of the aortic valve. It could be due either to a chronic rheumatic involvement with some interadherence of the cusps or to complicating bacterial vegetations. We can use the description of the aortic second sound here any way we want to. For my "rheumatic" purposes it was absent.

The laboratory studies, particularly the x-ray films and electrocardiogram, showed a big left ventricle; nothing is said about the auricles, which I presume were not demonstrably enlarged. The lung fields were clear, and there were said to be water-hammer pulsations in the aorta. The electrocardiogram makes me suspicious of a pure aortic lesion. There was a normal electrical axis. Again I am not sure, and I commend it to our staff perhaps to look up, whether or not we have had any cases of free aortic regurgitation due to syphilis in which we did not have evidence of left-axis deviation by electrocardiogram, unless it was complicated by something else. If one is supporting a rheumatic story, one would suggest that there also was a mitral lesion to give a compensating right-ventricular effect on the electrocardiogram. Another thing that is somewhat against this being a primary syphilitic process is that the diagnosis was made five years before

entry, and he proceeded to live along about as usual, I should say, until he acquired some sort of infection. He did not go rapidly downhill the way so many patients with syphilitic aortitis do when the aortic valve and the regions of the coronary ostia are involved, and he lived longer than the average patient with syphilitic aortitis after the diagnosis of the valve lesion.

I suppose I should wonder whether he had a congenital heart. The likely types would be interventricular septal defect or patent ductus arteriosus. A patent ductus arteriosus might cause some of the peripheral signs of aortic regurgitation, but an interventricular septal defect would not, nor is the description of the murmurs at all suggestive of patent ductus arteriosus. I think I have to make a diagnosis of an underlying rheumatic heart, with aortic regurgitation and some degree of stenosis. Whether the stenotic element was of a rheumatic nature or due to bacterial vegetations, I do not know. I am also going to guess that Dr. Mallory found some involvement of the mitral valve, with mitral regurgitation, and that there was a superimposed subacute bacterial endocarditis, at least on the aortic valve.

I am left with the question what to say about syphilis in this case. It appears that the patient had syphilis, including infection of the central nervous system, but I can only guess that, on the law of probability, there were syphilitic lesions in the aorta; so I might as well put it in for good measure. He died suddenly with a combination of congestive failure and some other factor that might have been embolic. There is nothing on which I can make a diagnosis of the terminal event.

Parenthetically, I should like to make one short note about "water-hammer pulsations." In deference to the members of the X-ray Department, whom I respect very much, the term "water hammer" refers to something you can palpate, not something you can see. Corrigan, when he described water-hammer pulse, was familiar with a scientific instrument called the water hammer. When I ask physicians what this is, they usually say it is the noise in steam-radiator pipes, or has something to do with a hydraulic ram. In reality, a water hammer is an instrument that has been used by teachers of physics for many years, to illustrate the falling of liquids in a vacuum. The water rises and falls in a mass and gives a sensation of shock to the palpating hand and an audible blow as it strikes the bottom of the tube.

DR. JAMES R. LINGLEY: The films showed

marked enlargement of the heart, as described, the enlargement being almost entirely left ventricular. In this oblique view one sees no auricular enlargement. The aorta is certainly not dilated. In fact, it appears to be rather small. The lungs are clear. There is no evidence of coarctation. I think the x-ray appearance bears out Dr. Sprague's diagnosis of an aortic-valve lesion, more likely rheumatic than syphilitic. It would certainly be unusual to have a small aorta in syphilitic aortitis.

DR. PAUL D. WHITE: Have you any comment to make about the blood-pressure difference in the arms?

DR. SPRAGUE: I thought that was more than we ordinarily see, but I cannot find enough in the aorta by x-ray or physical examination to explain it.

DR. WYMAN RICHARDSON: There was a great deal of disagreement about this case. Dr. Dieuaide and Dr. Bland are here, and they can express their opinions later. We all agreed that he had bacterial endocarditis. I thought the patient had rheumatic heart disease by somewhat the same, but not so good, reasoning as that of Dr. Sprague. Several things interested us. One was the manner of death; another was the urinary situation. The patient appeared to be uremic, and whether that was due to stasis or to nephritis associated with bacterial endocarditis I was not sure. The anemia was unusual and looked more like hereditary Mediterranean anemia than that due to an infection. I hesitated to speak of that because so many other things were running through this case. The albumin-globulin ratio was rather curious and caused a good deal of comment, but we still did not, I think, lay a great deal of stress on it. It suggests the possibility of liver disease.

DR. FRANCIS R. DIEUAIDE: I should like to differ mildly with a portion of Dr. Sprague's analysis, in that I think this thing he calls a rarity, that is, bacterial endocarditis in association with syphilitic disease of the aorta, depends entirely on how much we see of the latter disease. There were three series of cases reported last year,¹⁻³ and I know from my own experience that one sees much more of it in localities where there is a good deal more syphilis than there is here. I should not like to call the combination rare. Secondly, one has to be careful about putting too much weight on the x-ray appearance of the aorta, because we have had the experience of finding even aneurysms of the first portion of the aorta when the rest of the aorta is not involved. It is no great rarity for *syphilitic aortitis to be very patchy, and sometimes the ring of the aorta is extensively de-*

stroyed without spread of the involvement upward. So although I agree in general with Dr. Sprague's reasoning about the case, I think the argument for syphilitic aortitis with involvement of the valve ring is a fairly good one. Also I do not believe that the course of syphilitic aortitis even with involvement of the ring or valve to the point that the peripheral signs of regurgitation occur, is necessarily so short. In the past we have not seen these patients very often until they had symptoms of failure. Now in the large clinics for the treatment of syphilis, where patients are brought in willy nilly because of positive serologic tests, frequently with no symptoms whatever, we are seeing more patients in whom the early diagnosis of regurgitation can be made. I agree that the course is very short, once important signs of cardiac insufficiency appear, but I think we know very little about the preceding course, which probably runs for a fairly long period of time in a great many cases.

DR EDWARD F. BLAND: There is not much to say except there was one physical sign that disturbed us a good deal: the thrill was much more impressive than one might suspect from reading the description here. It was well marked and clearly localized in the third and fourth left interspaces near the sternum and could not be felt at the base of the heart. The vibrations over the vessels at the base of the neck were hardly more than one might expect with this degree of widening of the pulse pressure. At first glance several of us considered very seriously the possibility of some congenital lesion but hesitated to bring it into this already complicated picture. Dr. Reno Porter, when he saw the patient in the Out Patient Department prior to admission to the ward, first suggested an interventricular septal defect complicating an extensive involvement of the aortic valve. We considered the further possibility of a complicating patency of the ductus arteriosus, but absence of a prominence of the pulmonary cone, among other findings, forced us to discard this diagnosis. We continued to watch for pulmonary infarcts as supporting evidence of either a patent interventricular septum or ductus, but none were recognized. At the end I think the weight of opinion was that this was predominantly an obstructive lesion at the aortic valve, probably rheumatic in origin, with superimposed bacterial endocarditis.

DR EARLE M. CHAPMAN: Why could it not have been pulmonary stenosis rather than aortic?

DR BLAND: There was nothing clearly to suggest it,—no evidence of right-axis deviation in the electrocardiogram and no cyanosis,—and all

the peripheral signs pointed to deformity of the aortic valve.

CLINICAL DIAGNOSES

Central nervous system syphilis
Aortic regurgitation, ? type
Subacute bacterial endocarditis
Nephritis, ? type
Syphilis of liver?

DR SPRAGUE'S DIAGNOSES

Rheumatic heart disease, with aortic regurgitation and stenosis (and probably mitral regurgitation).
Subacute bacterial endocarditis
Syphilitic aortitis

ANATOMICAL DIAGNOSES

Congenital heart disease: interventricular septal defect, ? bicuspid aortic valve.
Probable rheumatic heart disease, with aortic stenosis
Subacute bacterial endocarditis: aortic valve and septal defect
Syphilitic aortitis
Septic infarction of the lungs
Chronic passive congestion
Tabes dorsalis

PATHOLOGICAL DISCUSSION

DR TRACY B. MALLORY: There was an obvious bacterial endocarditis, but the real question, of course, concerns the substratum on which it had developed. The aorta showed patchy scarring, which was grossly and microscopically quite characteristic of syphilis. It stopped abruptly, however, several millimeters above the commissures and coronary ostia. The aortic cusps instead of being separated were fused with dense fibrous tissue. At one commissure this fusion was so complete as to be suggestive of a congenital bicuspid valve. The other commissure looked more like an old rheumatic lesion, and was so diagnosed despite the fact that the mitral valve was negative. Overlying the chronic changes were fresh vegetations characteristic of bacterial endocarditis. When the heart was first examined we were surprised by the fact that the right ventricle was very much hypertrophied, proportionately quite as much or more than the left, a finding that accounts, of course, for the lack of axis deviation. Not until the valve leaflets were reflected did we discover a small interventricular septal defect, with bacterial vegetations clustered about the mouth in each ventricle. We did find two small septic infarcts in the lungs but no major pulmonary embolus. This patient unquestionably had syphilis of the

mia, leukocytosis and lowered serum protein. Furthermore, pancreatic cysts occur more frequently in women than in men, and the maximum incidence is between twenty and forty years of age. I shall refrain from speculating on the particular type of pancreatic cyst this one is—whether a cystic adenoma, a hemangioma or a simple retention cyst—and limit myself to the statement that the surgeon found a large pancreatic cyst filled with blood.

DR. GRANTLEY W. TAYLOR: Dr. Rogers has said that a pancreatic cyst traditionally presents between the colon and stomach. Quite obviously this stomach is pushed down, and the cyst is above the stomach. I think that pancreatic cysts very frequently occupy the position that this one does and that they do not usually or commonly present below.

DR. ROGERS: Whipple* states that, although some go down into the pelvis and some present above the stomach, the majority are between the stomach and colon. He had 133 cases, in which more than half the cysts were exactly in the midline, with about 40 per cent slightly to the left and only 10 per cent slightly to the right; they occurred at varying levels, but almost all were in the upper abdomen.

DR. JOHN D. STEWART: I should like to ask Dr. Rogers if he has any difficulty explaining the fever and leukocytosis on the basis of the diagnosis he has made.

DR. ROGERS: Those are the only things that stick in my throat, and I am assuming that the presence of the hemorrhage is responsible for them. Of course you cannot tell without any past history whether the patient might not have had some other coexisting condition that would account for anemia, leukocytosis and, possibly, fever. She was in the last day of her menstrual period, of course, but I am hoping that sudden severe hemorrhage into the cyst would account for all the blood findings.

DR. TRACY B. MALLORY: Acute external hemorrhage severe enough to produce a red-cell count of 2,500,000 will account for a considerable leukocytosis.

DR. STEWART: And give a temperature of 102° F.?

DR. MALLORY: If it were external it would not elevate the temperature.

Another point, the hemoglobin of 80 per cent

is manifestly impossible, but it must have been relatively high in comparison to the red-cell count, a finding that suggests a very acute hemorrhage.

DR. EDWIN L. CANTLON: This patient came into the Emergency Ward at night, and although we did not think of the myriad of things Dr. Rogers has mentioned, we came to the same conclusion that he did and operated on her a couple of hours after admission. We found exactly what Dr. Rogers has described—a large cyst of the pancreas, which was presenting through the gastrohepatic ligament. The thing that was a bit hard to explain was the fact that the peritoneal cavity was full of fresh blood, a condition that we did not suspect from clinical examination. The blood was coming out of the foramen of Winslow, and a finger introduced into the foramen very quickly confirmed the impression that the mass was in the pancreas. By separating the gastrohepatic ligament it was easily removed. The bleeding points in the pancreas were readily stopped with atraumatic sutures.

CLINICAL DIAGNOSIS

Hemorrhage into cyst of pancreas.

DR. ROGERS'S DIAGNOSIS

Hemorrhagic cyst of pancreas.

ANATOMICAL DIAGNOSIS

Papillary adenocystoma of the pancreas, with hemorrhage.

PATHOLOGICAL DISCUSSION

DR. MALLORY: The cyst that Dr. Cantlon resected was lined with epithelium and showed numerous papillary processes, being essentially similar to the cyst in the case that was presented about a month ago. It did not appear to be very rapidly growing, but experience leads one to believe that epithelial cysts containing many papillary processes, whatever their origin, are potentially malignant. I am not willing to give an unqualifiedly good prognosis for this patient. The cyst was markedly distended with fairly fresh blood clot.

DR. ROGERS: Do you think the cyst had been there for a long time, undiscovered?

DR. MALLORY: I should certainly think it must have been present for months at least. Probably it was fairly small until it was distended by the hemorrhage.

*Whipple, A. O. *Surgery of the pancreas*. In *Nelson New Loose-Leaf Surgery*, Vol. V. Chap VIII Pp 397-448B New York Thomas Nelson & Sons, 1937. P. 433

The New England Journal of Medicine

Formerly

The Boston Medical and Surgical Journal

Established in 1828

OWNED BY THE MASSACHUSETTS MEDICAL SOCIETY AND
PUBLISHED UNDER THE JURISDICTION OF THE COMMITTEE
ON PUBLICATIONS

Official Organ of

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SUBSCRIPTION TERMS: \$6.00 per year in advance postage paid for the United States; Canada \$7.04 per year; Boston funds \$8.52 per year for all foreign countries belonging to the Postal Union.

MATERIAL for early publication should be received not later than noon on Saturday.

THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to *The New England Journal of Medicine*, 8 Fenway Boston, Massachusetts.

A STATE HOSPITAL FOR THE CARE OF PSYCHOTIC CHILDREN

THE desirability of establishing a hospital for the care of mentally ill children has long been in the minds of many physicians in Massachusetts. At present, there is no such provision. Not many children, to be sure, break down mentally compared with the vast number of adults who apply yearly for care. In 1939, for example, only one hundred children under fifteen years of age were admitted to state hospitals for mental diseases in Massachusetts. About ten of them had epilepsy and were adequately cared for at the Monson State Hospital. The ninety had to find whatever accommodations they could in the other state institutions.

These one hundred children, however, do not

belong in buildings designed and serviced for adults. They should be cared for in separate buildings, or at least in isolated wards, with special nurses and psychiatrists, who are interested particularly in the behavior disorders of childhood. This has long been recognized by other states such as New York, where three hospitals have special provisions for juveniles. An even better example is the endowed Bradley Home at East Providence, Rhode Island, a pioneer hospital for children's behavior disorders, where a great deal of valuable work has been done in the last few years to elucidate some of the problems connected with the psychotic child. A similar institution was established some years ago in Philadelphia, particularly dealing with those children showing behavior disorders after encephalitis lethargica.

A movement for a special hospital in Massachusetts is backed by the Massachusetts Department of Mental Health and also by the Massachusetts Society for Mental Hygiene. In the publication of the latter organization for January, 1941, facts will be found summarizing the situation. The Department of Mental Health has for many years requested funds to establish a children's unit on the grounds of the Metropolitan State Hospital at Waltham. The legislature of Massachusetts has never acted favorably on this suggestion, but it is hoped that when the facts and the opinions are clearly presented and better known, this important matter will not long be delayed.

THE MICROFILM SERVICE OF THE ARMY MEDICAL LIBRARY

THE Army Medical Library, in Washington, has recently inaugurated Microfilm Service for the benefit of physicians throughout the country, a microfilm being a strip of 35 mm motion picture film with images of printed pages photographed on it in sequence. By this method, any article in any one of the 4034 current medical periodicals taken by the library can be obtained in microfilm copies at a very reasonable price. The charge is 30

cents for each complete article not exceeding thirty pages in length, and 10 cents for each succeeding ten pages or fraction thereof. Thus, an article can be obtained quickly for reading on a microfilm projector. This is particularly valuable for articles appearing in obscure and rare journals. Many of the small medical libraries do not take more than 200 or 300 current periodicals. The large libraries, such as the Boston Medical Library, take 800 or 900, but even this is small when compared with those taken at the Army Medical Library. The films may be projected and read with a small hand projector; however, in most libraries, large machines are available, which throw the pages on a screen two or three feet in size.

How does one find out about an article that is not likely to come to one's attention? To supplement the microfilm service, the Army Medical Library has added another of great importance to the medical profession. A weekly bulletin, *Current List of Medical Literature*, is published. Divided into large subjects, the literature of the week, as received in the Army Medical Library, is listed by the titles of articles occurring in medical periodicals. Thus, by watching one of the forty-four general classifications, a physician interested in keeping current with a special subject can quickly pick up references to that topic in any published periodical received by the library. The lists cover practically all the printed medical matter in the world. In many cases, of course, the periodical may be at hand in his own office or in his own medical library. In cases where this is not so, the Army Medical Library offers a solution for quickly bringing him the article in question. For the research worker, this brings medical literature to his desk almost immediately, three to six months before he could find it in an index, such as the *Quarterly Cumulative Index Medicus*.

Both these services are run by the Friends of the Army Medical Library. The library co-operated by providing the necessary space for the work, and by supplying the publications from which the

microfilm copies are made. The only cost to the user is for actual labor and material required in making and distributing the microfilm copies. For the *Current List of Medical Literature*, a charge of \$5.00 a year is made, which it is hoped will cover the cost of issuing this weekly bulletin. It should be pointed out, moreover, that occasionally, in addition to the current list of periodicals, a list of books received in a period of a month or six weeks at the Army Medical Library is also given to subscribers without additional charge.

Thus the Army Medical Library, the largest and most efficient in the world, becomes a national medical library, serving the medical profession throughout the land. To many, such a course has long been a cherished ideal. With a new building in sight for the library and with an expanding service, the medical profession should be appreciative of the fact that the Army Medical Library is alive to the present needs of the profession.

MEDICAL EPONYM

HUNTERIAN CHANCRE

On page 218 of the volume, *A Treatise on the Venereal Disease* (London, 1786) by John Hunter (1728-1793), the following description appears:

This, like most other inflammations which terminate in ulcers, begins first with an itching in the part; if it is the glans that is inflamed, generally a small pimple appears full of matter, without much hardness, or seeming inflammation, and with very little tumefaction, the glans not being so readily tumefied from inflammation as many parts are, especially the prepuce; nor are the chancres attended with so much pain or inconvenience, as those on the prepuce; but if upon the fraenum, and more especially the prepuce, an inflammation more considerable than the former soon follows. . . . The itching is gradually changed to pain; the surface of the prepuce is in some cases excoriated, and afterwards ulcerates; in others a small pimple, or abscess, appears as on the glans, which forms an ulcer. A thickening of the part comes on, which at first, and while of the true venereal kind, is very circumscribed, not diffusing itself gradually and imperceptibly into the surrounding parts, but terminating rather abruptly. Its base is hard, and the edges a little prominent. When it begins on the fraenum, or near it, that part is very commonly wholly destroyed, or a hole is often ulcerated through it.

R. W. B.

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TOXIC SEPARATION OF THE
PLACENTA, WITH DEATH

A thirty-five year-old para IV, when about thirty-seven weeks pregnant, was sent into the hospital because of a large trace of albumin in the urine and a blood pressure of 170 systolic. She remained there two days and was sent home apparently improved. She was not seen again until three weeks later, when she came into the hospital in active labor; there was profuse vaginal hemorrhage, and the patient was unable to see.

There was no history of scarlet fever. The three previous pregnancies were not described in the record; all three children were living and well. The prenatal care had been inadequate.

Physical examination at the time of the second admission was essentially negative. The heart was not enlarged, there were no murmurs. The pelvic measurements were normal. Although the blood pressure was not recorded, it was probably high, since the urine showed a large trace of albumin. The uterus was enlarged to the size of a full term pregnancy, the patient was in labor. No fetal heart could be heard. Vaginal examination showed the cervix to be dilated to admit four fingers, no placenta was felt, and the patient was bleeding profusely. A diagnosis of separation of the placenta at term was made. Dilatation of the cervix was completed under ether anesthesia and a version was accomplished. The placenta came away with the stillborn baby. The uterus was packed with gauze, and intravenous glucose was given. The patient was sent for transfusion but died before it could be started.

Comment. This is a typical case of toxic separation of the placenta. This patient should never have been discharged from the hospital after only two days of treatment. It is possible that, had she been examined at the time of the first admission, the cervix might have been found to be favorable for elective induction by rupture of the membranes. If this had been possible, the subsequent fatal result probably would not have developed. If the patient had been treated more conservatively at the time of the second admission,—that is, by rup-

turing the membranes, using small amounts of pituitary extract, and giving a transfusion,—it is probable that normal delivery could have been effected without the shock attendant on dilatation of the cervix and internal podalic version; with such a degree of dilatation it is unlikely that a cervical pack and Spanish windlass would have been necessary. She was a very sick patient when she arrived in the hospital, and it is only barely possible that more conservative handling would have prevented the fatality.

DEATHS

ANDREWS—HAROLD ANDREWS, M.D., of Boston, died June 9. He was in his sixty-ninth year.

Dr. Andrews received his degree from the Harvard Medical School in 1896. He was a fellow of the Massachusetts Medical Society and the American Medical Association, and was a member of the New England Obstetrical and Gynecological Society and the American College of Surgeons.

NORTON—GEORGE P. NORTON, M.D., of Fitchburg, died June 12. He was in his sixty-eighth year.

Dr. Norton received his degree from the Bellevue Hospital Medical College in 1895 and was on the staff of the Hurlburt Hospital, Fitchburg, for twenty-nine years. A former city physician and district medical examiner, he was, at the time of his death, chief medical examiner for the draft board under the Selective Service Act.

He was a member of the Massachusetts Medical Society, having been a president of the Worcester North District Medical Society, and was a member of the American Medical Association.

His widow, two sons, a daughter and a grandchild survive him.

CORRESPONDENCE

ILLUMINATION AND EYE HEALTH

To the Editor. For more than a quarter of a century our laboratory has been engaged in research aimed to provide a scientific foundation for the utilization of light and lighting as essential partners of vision and as controllable aids to seeing. With adequate facilities and without restrictions in scientific endeavor, characteristic of the research laboratories of the General Electric Company, the personnel devoted to this work has created a formidable structure, properly termed the "science of seeing." This term is used in order to distinguish it from the narrower science of physiologic optics which the more extended science includes. These researches have been conducted over a broad front and have contributed much toward easier seeing through a better understanding of the efficacy of light and lighting and other aids to seeing which influence the efficiency, comfort and welfare of human beings.

In the March 13 issue of the *New England Journal of Medicine*, Dr. David G. Coggin, not without dogmatism, naïveté and some sarcasm, apparently attempts to discredit the entire scientific structure which the researches of our laboratory have built. The absence of scientific spirit and method in his critique is further emphasized by implications that our motives are questionable. It should be obvious to those acquainted with the variety and number of researches in seeing prosecuted in our

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

laboratory that our work cannot be adequately discussed in a four-page paper such as that of Dr. Cogan. Neither can it be adequately discussed if the critic is inadequately familiar with it.

Statistics pertaining to the prevalence of defective vision are appalling and they should appeal to the interest of any profession or group which is in a position to lighten the visual burdens in our modern world in which critical tasks have been greatly multiplied in number and in duration. Such statistics should be particularly appealing to ophthalmologists, but Dr. Cogan seems to be more concerned with attempting to prove that poor lighting does not harm the eyes and that better lighting than has prevailed is unnecessary. In this respect his attitude is quite opposed to that of many distinguished members of his profession. (Lancaster, W. B. Ocular symptoms of faulty illumination. *Am. J. Ophthalm.* 15: 783-788, 1932. Jackson, E. Light for ocular health and efficiency. *Am. J. Ophthalm.* 18:374, 1935.)

Ignoring the sarcasm in his statement that the public has been subjected to a "research offensive" and that we have "inundated" various journals with technical papers bringing to the attention of professions and public the results of our researches, we admit feelings of gratitude and satisfaction for having had the opportunity to work so long in a field so important in modern civilization. The opportunity is still large, and it has always been open to others.

It is difficult and perhaps impossible to prove that poor illumination, combined with prolonged and critical seeing of near-vision tasks, directly harms the eyes. Certainly such conditions could not possibly be favorable to the eyes. However, the inability to obtain direct evidence is not uncommon in many sciences which deal with the welfare of human beings, such as the science of medicine. Much evidence must be indirect, and in the case of eyes, if one fairly views all the indirect evidence, he can hardly avoid the decision to utilize every controllable aid to seeing, whether it is type-size, light, eyeglasses, lighting or vitamins, to help reduce the severity of modern seeing. If Dr. Cogan will review the literature dealing with the foregoing aids to seeing, we are sure he will find that other professions are confronted with difficulties in supplying rigid and incontestable proofs of many accepted practices and principles.

Admittedly, we obtained much encouragement in deciding many years ago to devote a substantial part of our laboratory facilities to these researches, by broadly considering the evolution of human eyes and human beings under outdoor environmental factors, such as brightness-levels, quality of daylight and character of natural lighting. Nature is an inspiring textbook in the absence of knowledge, but we have never entertained the belief that philosophy per se proves anything. Nevertheless, theories are necessary in scientific work as temporary lines of communication between the known and the unknown; and they are also of value in encouraging researchers to invade this or that unknown. Beginning with such a view, we naturally explored the realm of physiologic optics and found that light (or more properly brightness) had been seldom considered or adequately utilized as a controlled variable and that lighting was almost entirely ignored. This left gaps in that field which it was necessary to fill. We filled some of these by giving light its proper place as an aid to seeing.

One result of our researches was to reveal that the criterion of visual acuity (as measured by the usual high-contrast objects) is not all-important. The ophthalmologist uses this function effectively to determine refractive

errors, and as a consequence he naturally thinks largely in terms of threshold-size. In many tasks the criterion of visual acuity is relatively inappropriate, as, for example, in tasks involving low contrasts. Nevertheless, it is interesting to note in this connection that Dr. Cogan states that visual acuity reaches a maximum at about 10 footcandles. This is not true, even for black objects on white backgrounds, as has been known since the time of Koenig. Actually in such cases, visual acuity is still increasing after an illumination of 100 footcandles has been reached. However, here it is well to emphasize that *illumination* and *brightness* are two different factors; and if a black test-object is viewed, not on a white background which diffusely reflects 80 per cent of the incident light, but on a gray background which diffusely reflects only 8 per cent of the light, the same brightness of background produced by 100 footcandles on a white background is produced by 1000 footcandles on a dark-gray background. It should be recognized that the backgrounds against which objects are seen in innumerable situations in the work-world, in the school and in the home do not provide high contrasts. What then becomes of Dr. Cogan's standard of 10 footcandles for maximal visual acuity? Obviously it is meaningless in itself and absurd as a categorical statement.

Turning to visibility, we are concerned with one of two fundamental aspects involved in every task of critical seeing. One is the visibility of the task and the other is ease of seeing or performing the task. In 1928, we completed an extensive research which established the relations among the four fundamental factors of the visual threshold—size, contrast, brightness and time. The Luckiesh-Moss Visibility Meter has been built upon an adequate foundation of knowledge of these relations. The time factor may be introduced if one desires. The relations of these fundamental factors are involved in the unit and scales of visibility which we have created. By means of this device we can measure visibility in terms of a scale of size or in terms of a scale of contrast. It does not matter particularly what scale or unit is used so long as the user understands the scale he is using, although some scales are simpler than others. The important matter is to be able to measure visibility in understandable terms. That we can do. In a world dependent overwhelmingly on visibility of objects there has been no practical means of measuring visibility. Obviously it is impractical to dissect a visual object or visual task into its component parts. Any contribution of this sort is entitled to encouraging consideration and constructive criticism. Already this device has been welcomed with enthusiasm in a variety of researches and practices beyond the important realms of the science and practice of lighting.

The Luckiesh-Moss Visibility Meter does not determine the footcandles "necessary" for any visual task as Dr. Cogan has stated. It merely determines the visibility of an object or task under any seeing conditions in terms of a meaningful unit and scale of visibility. Also the visibility of an object or task can be determined in terms of the visibility of a specific task, such as reading under specified conditions. By this means it is possible to make a difficult task of seeing of the same visibility as an easier task of seeing by taking advantage of any controllable aid to seeing, such as light and lighting. All tasks which are visible are not equally visible. However, it is possible to make many of them equally visible. Anyone is at liberty to determine his own "standard" of visibility, and by means of this visibility meter, to explore the realm of suprathreshold visibility, the important

world of everyday seeing which is completely ignored in considerations confined to thresholds

Dr Cogan devotes one paragraph to the extensive and important realm of psychophysiologic effects of seeing which our researches specifically invaded to supply a foundation of knowledge for ease of seeing. These researches invaded not only an unknown realm but one which had been almost completely ignored. The observed physiologic effects of seeing when correlated into a structure, form a highly integrated one. Of great practical importance is the fact that these researches have led to the development of certain criteria of ease of seeing which have been sorely needed. One in particular is the rate of involuntary blinking. We have used this criterion in more than a score of major researches not only in the realm of light and lighting but in other realms, such as typography and ocular refraction. The result is we now have a criterion of ease of seeing which is not only sensitive throughout a variety of applications, but which has meaning. In a few references which Dr Cogan mentions in opposition, he does not discuss the criteria used, which obviously are all important in interpreting results.

We have discussed a few aspects of Dr Cogan's article for the purpose of calling the reader's attention to the extensive structure which is described as the science of seeing and, particularly, to its complexity and to its contributions in various phases of civilized activities involving visibility and ease of seeing. This structure cannot be properly appraised by ignoring the data and criteria involved. Toward the end of Dr Cogan's discussion he reveals an inadequacy of concept in the statement, 'There is no valid reason for believing that man cannot judge the amount of illumination that gives him easy and comfortable seeing.' Such a possibility is just as far beyond the ability of a human being in respect to light and lighting as it is beyond his ability to specify, by means of his unaided senses, optimum conditions pertaining to such factors as diet, hygiene and eyeglasses. We do not believe that Dr Cogan would admit that one could or should choose his own eyeglasses solely on the basis of introspection by the patient. Almost all progress in science is due to devices which have aided human senses, and practically all progress has been achieved since man learned not to rely solely on his senses. Furthermore, much of the great mass of scientific knowledge available today has come from the realm of the unobvious which simply means that vast realm beyond the reach of our unaided senses.

MATTHEW LUCKIESH
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The above letter was submitted to Dr Cogan and the following reply was received:

To the Editor: The article referred to in the foregoing letter was one of the 'Medical Progress' series presenting an annotated analysis of the literature pertaining to illumination and eye health. It was specifically pointed out that there was little foundation for the widespread belief that damage to the eyes comes from low illumination, and since this misconception and much of the present campaign for more and more light is based on the researches of Luckiesh and Moss, their work was critically examined. The characterization of their work as a 'research offensive,' to which they now take exception, was not mine but was quoted from one of their own texts.

Statistics pertaining to the prevalence of defective vi-

sion are, as noted in the foregoing letter, appalling, but it is not apparent that this has anything to do with illumination. None of the usual lists of defective vision include, so far as I am aware, anything about faulty illumination as a cause. Since the authors now admit in this letter—and to my knowledge it is the first time they have done so in print—that it is impossible to prove that poor illumination harms the eyes, the authors should cease threatening the public with permanent injury, 'tragic toll' and deeply hidden penalties, which they have previously claimed come from inadequate illumination.

Their objection to the stated amounts of illumination necessary for maximum visual acuity and so forth are not issues with the reviewer but with the investigators cited in the article and it seems only scientifically appropriate that these investigators merit some recognition in the all inclusive 'science of seeing.'

I do not believe that the letter by Luckiesh and Moss should go without answer for while the subject may not seem of great importance to the reader, it is, in view of the medical implications with which it has been enshrouded, of sufficient concern to be taken seriously. It is especially desirable that the real issues be kept as free as possible of unnecessary verbalism and that adequate counsel in matters pertaining to medicine be made available to the public.

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243 Charles Street
Boston

NOTICES

ANNOUNCEMENT

DR ALLEN G. RICE announces the removal of his office on July 1 from 33 School Street, Springfield, to 146 Chestnut Street, Springfield.

CONSULTATION CLINICS FOR CRIPPLED CHILDREN IN MASSACHUSETTS, UNDER THE PROVISIONS OF THE SOCIAL SECURITY ACT

CLINIC	DATE	CLINIC CONSULTANT
Haverhill	July 2	William T. Green
Gardner	July 8	Mark H. Rogers
Brockton	July 10	George W. Van Gorder
Northampton	July 15	Garry deN. Hough, Jr.
Worcester	July 18	John W. O'Meara
Pittsfield	July 21	Frank A. Slowick
Fall River	July 28	Eugene A. McCarthy
Hyannis	July 29	Paul L. Norton

EXAMINATIONS FOR APPOINTMENTS IN THE MEDICAL CORPS OF THE UNITED STATES NAVY

Examinations for appointment as assistant surgeon (lieutenant junior grade), United States Navy Medical Corps, will be held at all the large naval hospitals and the Naval Medical Center, Washington D. C., on August 11 to 15 inclusive, October 6 to 9, inclusive, and January 5 to 9, 1942, inclusive.

Applicants for appointment as assistant surgeon must be citizens of the United States, more than twenty-one but less than thirty-two years of age at the time of acceptance of appointment and graduates of Class A medical schools who have completed at least one year of in-

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